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# Freenet: the long game

Evolution of Freenet since 2007

**15 years in 15 minutes**

Mitigating the pitch black attack  
and other changes

Dr. Arne Babenhauserheide

freenet



freenet

lost



interactive



core



media



tools



in the dark



future



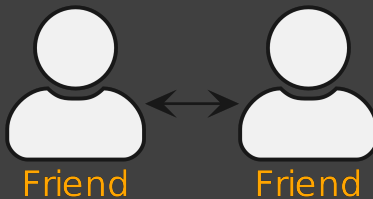
## Freenet since 2007

1999 Freenet started as a thesis by Ian Clarke, known to friends as *sanity*.

In 2007 it added its Darknet-Mode:

### Freenet Darknet

Friends connect to Friends.

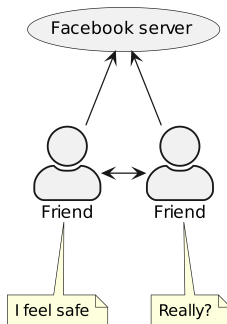


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friend-to-friend

## Friend-to-Friend like ...

The Friend-to-Friend Darknet mode works conceptually **like WhatsApp**, where you give a Facebook server your friends' phone numbers and then you can talk **directly**:



freenet



friend-to-friend

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in the dark



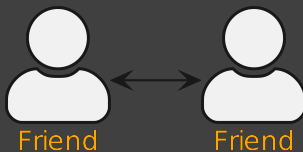
future



## But without the server

Different from WhatsApp, **Freenet avoids the central server**, so no one gets your friends' phone numbers.

### Without the server



I feel safe

I do, too!

freenet



friend-to-friend

lost



interactive



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in the dark



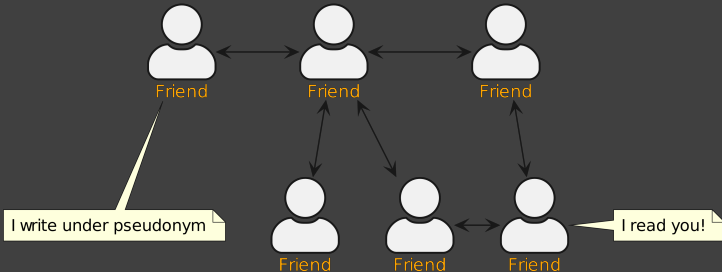
future



## Friend-of-a-Friend routing

By building a network on friend-connections where others can find what you write even when you're offline, Friend-to-Friend Freenet enables global pseudonymous publishing that is very hard to block.

### FOAF network



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friend-to-friend

## Chaos Computer Congress 2005

The new Friend-to-Friend Freenet was [presented](#) by Ian Clarke and Oskar Sandberg at the 22c3 in 2005, and it showed a beautiful method for confidential communication and censorship resistance.

freenet	lost	interactive	core	media	tools	in the dark	future
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chaos							

# The Attack

Then Christian Grothoff et al. found a flaw. And [proved it](#).

## Routing in the Dark: Pitch Black

Nathan S. Evans

Chris GauthierDickey

Christian Grothoff

Colorado Research Institute  
for Security and Privacy

Department of Computer Science  
University of Denver, USA  
{natevans,chriscg,grothoff}@cs.du.edu

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## “But Opennet works”

For 14 years we lived in denial, because “Opennet works”.

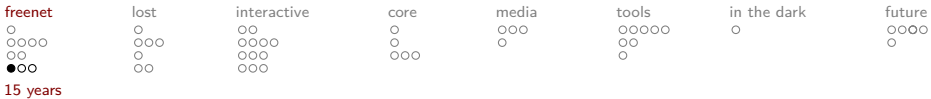
### The mitigation

But in 2021 we finally mitigated the attack.



→ build 1490: “pitch black streaming” ←





## 15 years

That's why now is the time to talk about the changes in Freenet since 2007. 15 years of continuous improvements to the Friend-to-Friend Freenet network.

Which is a **Darknet**, because that is the only privacy preserving way to make this work:

**protect the privacy of persons sharing data**

*This covers the needs for protection expected from a secure data broker . . . for Multi-Party Data Exchange in IoT for Health –E. Benoit and J. Sliwa, Bern University of Applied Sciences, Switzerland, 2020, in Applied Approach to Privacy and Security for the Internet of Things*

freenet	lost	interactive	core	media	tools	in the dark	future
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15 years

## 14 years to mitigate pitch-black

In 2005 Freenet showed that an Opennet with **arbitrary connections cannot ever be secured well enough**, but that a **friend-to-friend model can** be. In 2007 it was working, but the pitch black attack was published which showed how to utterly destroy that friend-to-friend network.

It would take us 14 years to mitigate the attack. During that time Freenet progressed a lot. And Opennet lived far longer than we expected.



## Features and Friction: 15 years of Freenet development

Those 15 years — 14 years of development plus the one year since the mitigation was in place — shaped Freenet from a tool for the dedicated into an easy to use platform that covers the needs of most communication from Social networking over Blogging to Video-on-Demand without servers or central point of failure.

But let us begin with the lost: technologies that faltered.

freenet      **lost**      interactive      core      media      tools      in the dark      future

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**lost: technologies that faltered**

# lost

In its 22 years of existence, Freenet has seen tools that did not stand the test of time — either because their model did not work out, or because they did not see maintenance or were replaced by newer tools.

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the dead

# Commentmaker Plugin

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Freenet: the long game

freenet



lost



interactive



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in the dark



future



the dead

# Activelink freesite-tags

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Freenet: the long game

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# Thaw torrent-alikes

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Freenet: the long game

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the undead

# Frost

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Freenet: the long game



freenet



lost



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tools



in the dark



future



the sleeping

# Freetalk

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Freenet: the long game

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the sleeping

# Spider and Library

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Freenet: the long game

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# interactive

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Freenet: the long game

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**Freenet: the long game**

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the long-lived

# FMS and Flip: Forums and IRC

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Freenet: the long game

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the long-lived

# Freemail

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Freenet: the long game

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the long-lived

# WoT: The disruption antidote

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Freenet: the long game

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the long-lived

# Precisely updating and subscription-based



## OPTIMIZING A DISTRIBUTED SPAM FILTER FOR FREENET

AKA

THE WEB OF TRUST DEVELOPER'S MANUAL

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Freenet: the long game



freenet



lost



interactive



core



media



tools



in the dark



future



the easy

# Sharesite

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freenet



lost



interactive



core



media



tools



in the dark



future



the easy

# Sone

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freenet



lost



interactive



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in the dark



future



the easy

# Freemail

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Freenet: the long game

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the mobile

# mobile-node: Freenet on Android

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Freenet: the long game

freenet



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in the dark



future



the mobile

# FreeChat

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freenet



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in the dark



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the mobile

# icicles

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Freenet: the long game

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# core

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Freenet: the long game

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in the dark



future



assimilated

# Activelinks to USKs

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Freenet: the long game



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# Long N2Ntms

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Freenet: the long game

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# Scaling Subscriptions for WoT

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Freenet: the long game

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# Fast and Slow nodes

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Freenet: the long game

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# Improved HTML and CSS

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Freenet: the long game

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# Audio streaming

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Freenet: the long game

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# Video on demand

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Freenet: the long game

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# Indexes

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- ~~Babbel flog-linking~~
- ~~Enzos-Index~~
- Spider → Clean Spider

*structure: raw → cleaned*

freenet



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interactive



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media



tools



in the dark



future



plugins

# Shoeshop

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Freenet: the long game



freenet



lost



interactive



core



media



tools



in the dark



future



plugins

# jfniki

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freenet



lost



interactive



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tools



in the dark



future



plugins

# KeyUtils

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freenet



lost



interactive



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media



tools



in the dark



future



plugins

# Keepalive

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freenet



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interactive



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media



tools



in the dark



future



plugins

# Freereader

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Freenet: the long game

freenet



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interactive



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tools



in the dark



future



commandline

# pyFreenet

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Freenet: the long game

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# infocalypse

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Freenet: the long game

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# jSite

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Freenet: the long game

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# pitch black attack: The mitigation



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## open questions

- Better routing? Embeddings that do not preserve the uniform keyspace are now possible with the pitch black mitigation
- Friend-to-Friend over tor and i2p? (needs UDP)
- Steganography Transport Plugins

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# Plans

*No plan survives contact with reality, but a good plan provides set-pieces for the path you might actually walk.*

- [High-Impact Tasks](#)
- [High-Level Roadmap](#) — structured by major version
- [Bugtracker-Roadmap](#) — very detailed but outdated



# High-Impact Tasks I

- Fix a **release-blocker** for 8.0 from the [Roadmap](#)
- **Packaging:** [Debian](#) ([info](#)), Guix, . . . , beta-channel
- **Plugin** furbishing: Freemail, Keepalive, Freereader, Shoeshop, Floghelper, Flircp, JFniki: workflows enjoyable, cope with Freenet as proxy
- Port **plugin buildsystems** to gradle for easier CI ([info1](#), [info2](#))
- **Decentralized programming:** port [infocalypse](#) to python3, improve its [WoT integration](#)



## High-Impact Tasks II

- **Content filters** for modern codecs can make Freenet viable for live streaming: [fix vorbis](#), opus for live audio ( [stream into Freenet](#) ), webm with vp9 (video) and av1 (video on demand)
- **Freenet Mobile**: ref exchange as with [Icicle](#), spread via NFC and similar, improve [FreeChat](#), spread via Messengers (WhatsApp, Signal, Telegram, Threema, DeltaChat, ...)
- Enable **clicking** on `freenet:...-Links` (and `magnet:?xt=urn:freenet:CHK:...)` on websites. Browser-plugin needs [allow-listing the freenet: schema](#) (issue)
- **Stream-into-Freenet GUI**
- [Revamp F2F workflow](#) and communication (mobile first).



## High-Impact Tasks III

- Revamp **initial page**: help sections, links, official plugins.
- **REST API** (start with [fresta](#)) and API documentation, examples and documentation
- Simplify updating and changing **dependencies** over Freenet.
- Make the **noderef parser** work **always**, even if linebreaks are lost, unicode is mis-escaped, or email shows the user 7-bit ASCII encoding.
- **Use** Freenet. **Talk** about Freenet. **Spread** Freenet.

freenet



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future



hope

# Easy Issues

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Freenet: the long game



# Towards another 15 years! 😊

Can you imagine where Freenet will then be?

Will you help to shape it?

Let's build a better future together!

→ [freenetproject.org](https://freenetproject.org) ←

*I worry about my child and the Internet all the time, even though she's too young to have logged on yet. Here's what I worry about. I worry that 10 or 15 years from now, she will come to me and say 'Daddy, where were you when they took freedom of the press away from the Internet? –Mike Godwin, [Electronic Frontier Foundation](https://www.eff.org/)*

# References I