

# Outline & Outline SDK

## Empower Connectivity Across Splinternets

SplinterCon 2023



Jigsaw is a unit within Google that explores threats to open societies, and builds technology that inspires scalable solutions

[jigsaw.google.com](https://jigsaw.google.com)





## OUR FOCUS AREAS

Cybersecurity & Censorship  
Misinformation & Hate  
Violent Extremism



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# Agenda

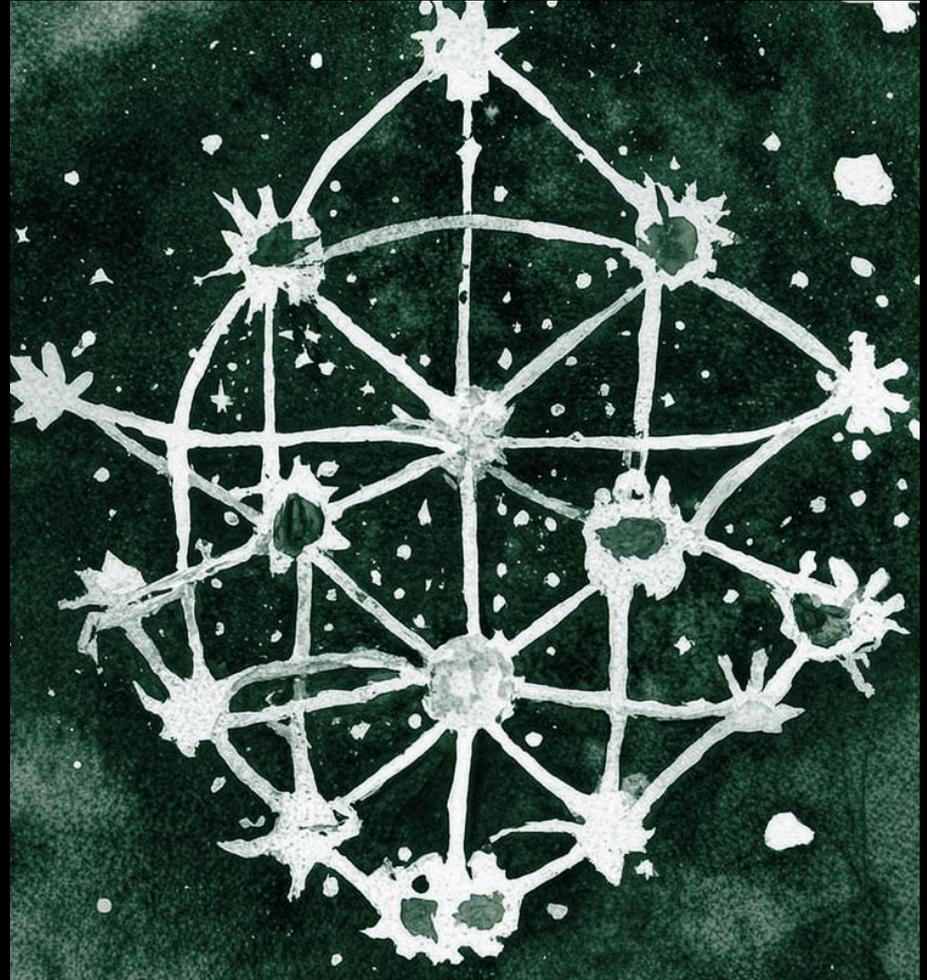
- Outline Overview
- How Outline Works
- Outline SDK
- Demo: Proxy-based Strategy
- Demo: Proxy-less Strategy

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# Outline

DIY VPN solution that  
empowers people to  
fight censorship in a  
decentralized and  
grassroots way



# Democratizes VPN access

Anyone can be a VPN provider,  
including you

Free and open-source code  
Customizable, extensible

Run on any cloud, for cheap

# A VPN you can trust

Own your server, or get access from a closer organization you trust

No logging of PII, inspectable server

Code audited by the community

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**Outline consists of two products that work together:**

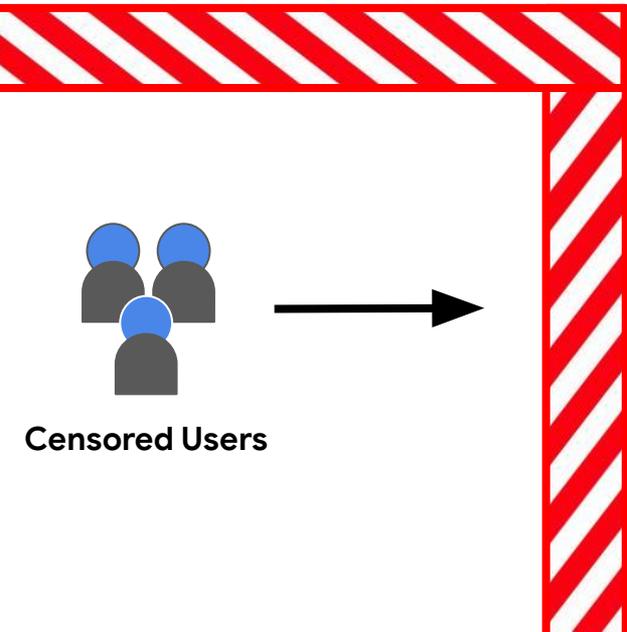
 **Outline Manager**

Create and share access to your own Outline VPN server(s)!

 **Outline Client**

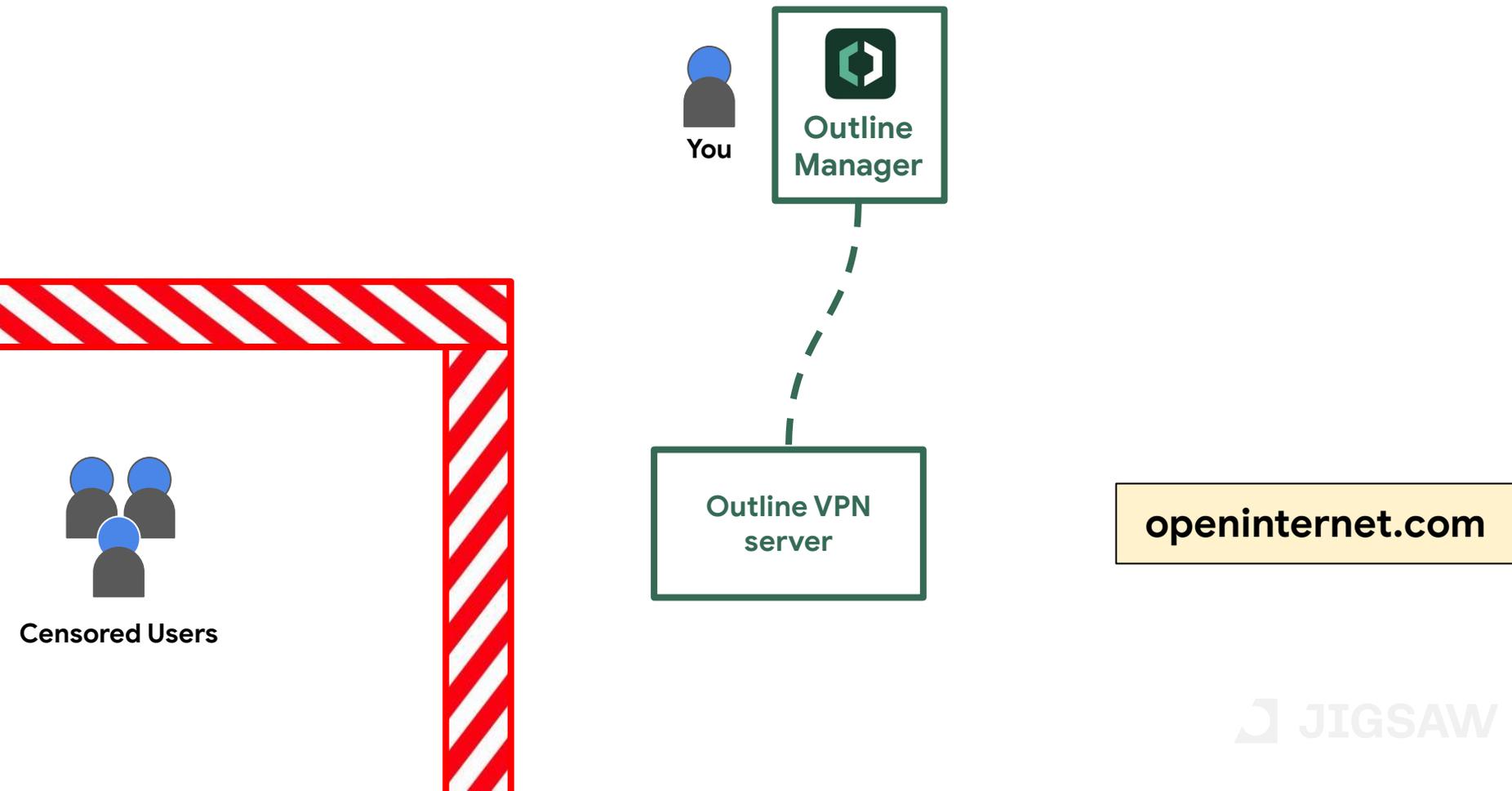
Connect to any existing Outline VPN server(including your own)!

# How does an Outline VPN work?

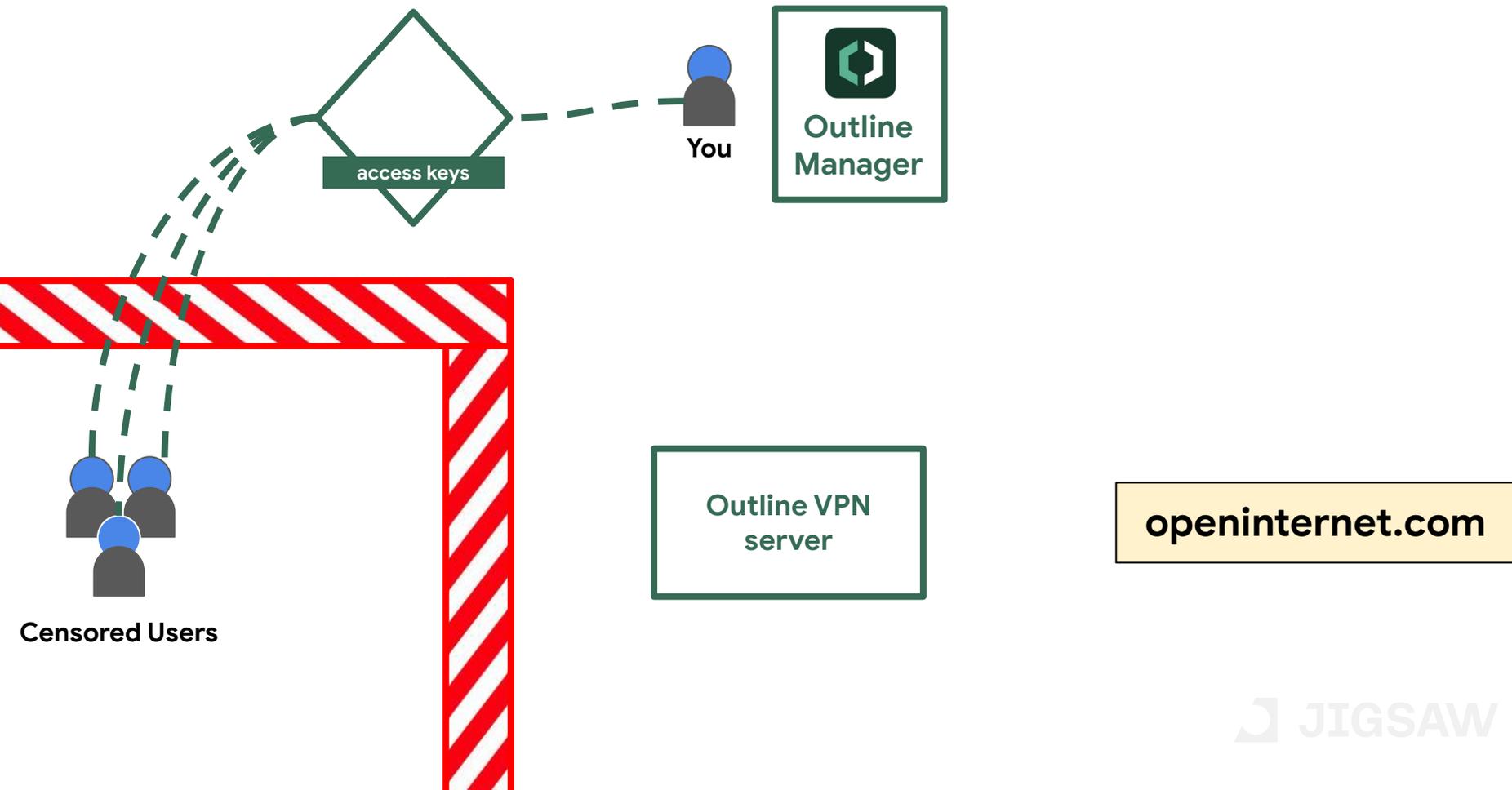


[openinternet.com](https://openinternet.com)

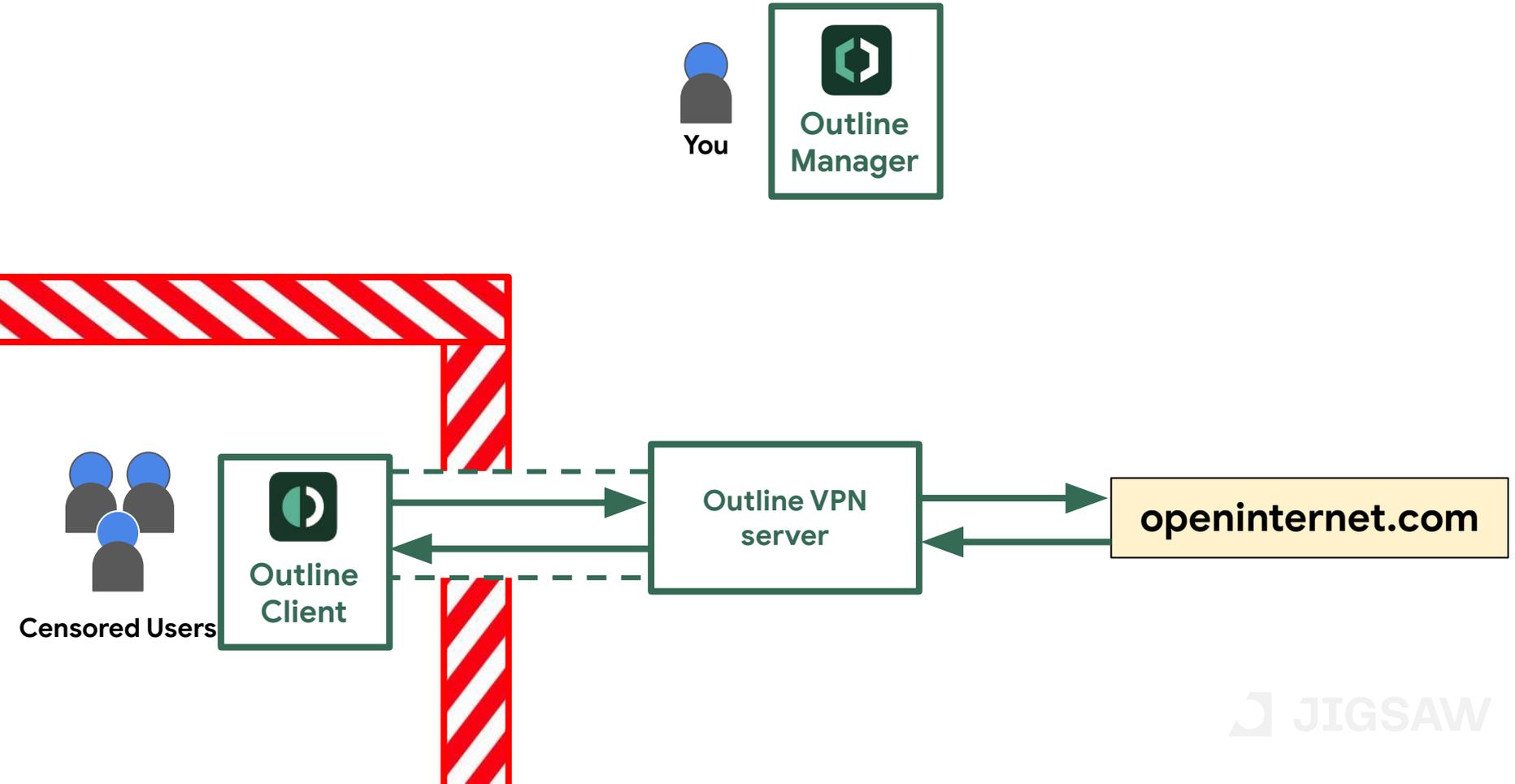
# How does an Outline VPN work?



# How does an Outline VPN work?



# How does an Outline VPN work?





## Outline Manager

- <https://getoutline.org/get-started/#step-1>
- <https://github.com/Jigsaw-Code/outline-server>



## Outline Client

- <https://getoutline.org/get-started/#step-3>
- <https://github.com/Jigsaw-Code/outline-client>

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# Outline SDK

A cross-platform library and set of tools leveraging advanced strategies to protect apps and VPN tools against network-level interference.



# Outline SDK

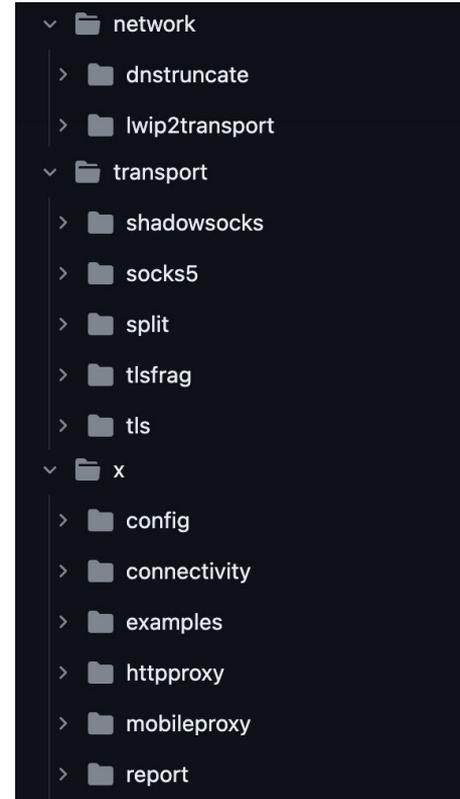
Easily add proven censorship-resistance technology to **your own app**

Mix and match, **customize** and create new strategies to meet your needs

**Evolve** with the Outline Community

# Diverse Protocols and Strategies

- Multiple built-in transports
  - TLS
  - HTTP CONNECT
- Multiple built-in protocols
  - Shadowsocks
  - SOCKS5
- Fully customizable and extensible
  - Easily derive your own transport or protocol implementations
- VPN Library
  - User-space network stack



# Utilities for Researching and Everyday Use

Outline SDK's `curl`

## Outline Fetch

This app illustrates how to use different transports to fetch a URL in Go.

Direct fetch:

```
$ go run github.com/Jigsaw-Code/outline-sdk/x/examples/fetch@latest https://ipinfo.io
{
  ...
  "city": "Amsterdam",
  "region": "North Holland",
  "country": "NL",
  ...
}
```

# Utilities for Researching and Everyday Use

Outline SDK's dig

## Domain Resolution Tool

The `resolve` tool lets you resolve domain names with custom DNS resolvers and using configurable transports.

Usage:

```
Usage: resolve [flags...] <domain>
-resolver string
    The address of the recursive DNS resolver to use in host:port format. If the port is missing, it's assumed to
-tcp
    Force TCP when querying the DNS resolver
-transport string
    The transport for the connection to the recursive DNS resolver
-type string
    The type of the query (A, AAAA, CNAME, NS or TXT). (default "A")
-v
    Enable debug output
```

Lookup the IPv4 for `www.rferl.org` using the system resolver:

```
$ go run github.com/Jigsaw-Code/outline-sdk/x/examples/resolve www.rferl.org
104.102.138.8
```

# Utilities for Researching and Everyday Use

## Outline VPN Command-Line Client

A CLI interface of Outline VPN client for Linux.

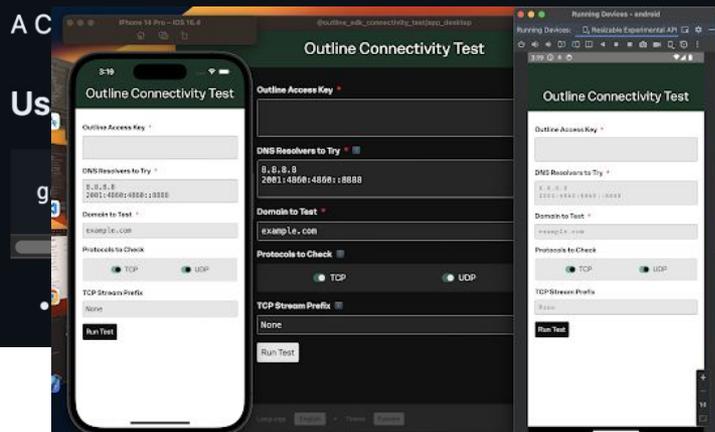
### Usage

```
go run github.com/Jigsaw-Code/outline-sdk/x/examples/outline-cli@latest -transport "ss://<outline-server-access-key>"
```

- `-transport` : the Outline server access key from the service provider, it should start with "ss://"

# Utilities for Researching and Everyday Use

## Outline VPN Command-Line Client



```
s:/outline-cli@latest -transport "ss://<outline-server-access-key>'
```

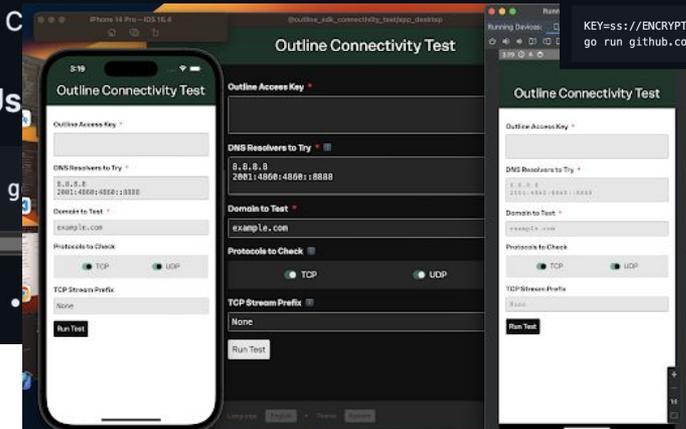
service provider, it should start with "ss://"

# Utilities for Researching and Everyday Use

## Outline VPN Command-L

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## HTTP-to-Transport

This app runs a local HTTP-CONNECT proxy that dials the target using the transport configured in the command-line.

Flags:

- `-t transport` for the transport to use.
- `-addr` for the local address to listen on, in host:port format. Use `localhost:0` if you want the system to dynamically pick a port for you.

Example:

```
KEY=ss://ENCRYPTION_KEY@HOST:PORT/  
go run github.com/Jigsaw-Code/outline-sdk/x/examples/http2transport@latest -transport "$KEY" -addr localhost:54321
```

```
./outline-cli@latest -transport "ss://<outline-server-access-key>"
```

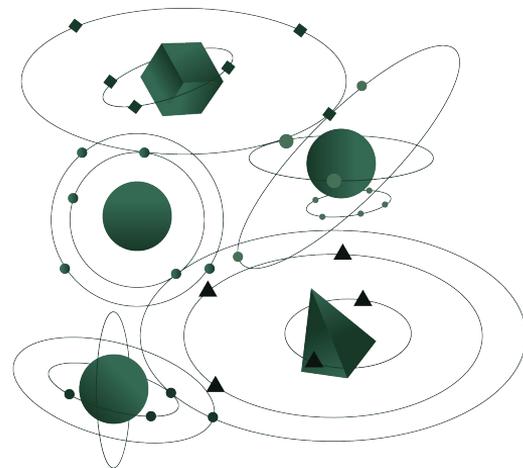
service provider, it should start with "ss://"

## Flexible Text-Based Config

- Combine and try different strategies through a simple text format:
  - `ss://<outline-server-key>`
  - `socks5://<host>:<port>`
  - `frag:<len>`
  - `tls:sni=<new-sni>`
  - `tlsfrag:<len>`
  - ...
- Creatively combine different configs through “|”:
  - `frag:2|frag:10|ss://<outline-key>`
  - `tls:sni=<sni>&certname=<host>|socks5://<host>:<port>`
  - ...

# Find Alternative Paths to the Internet

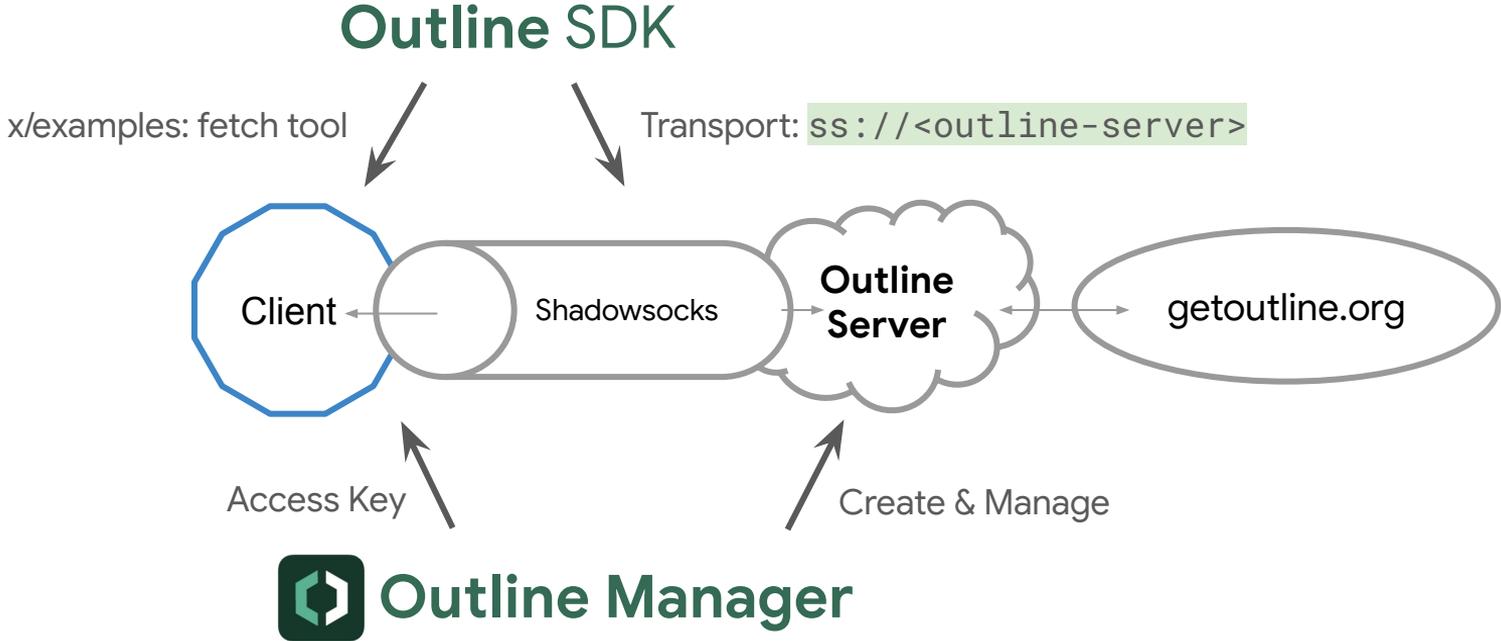
- Multiple hops (onion routing):
  - `ss://<hop1> | ss://<hop2> | ss://<hop3>`
- Alternative networks to provide resilience in a splinternet scenario:
  - Satellite networks
  - Traditional telephone networks
  - Mesh networks
  - Educational networks
  - Bluetooth networks
  - ...



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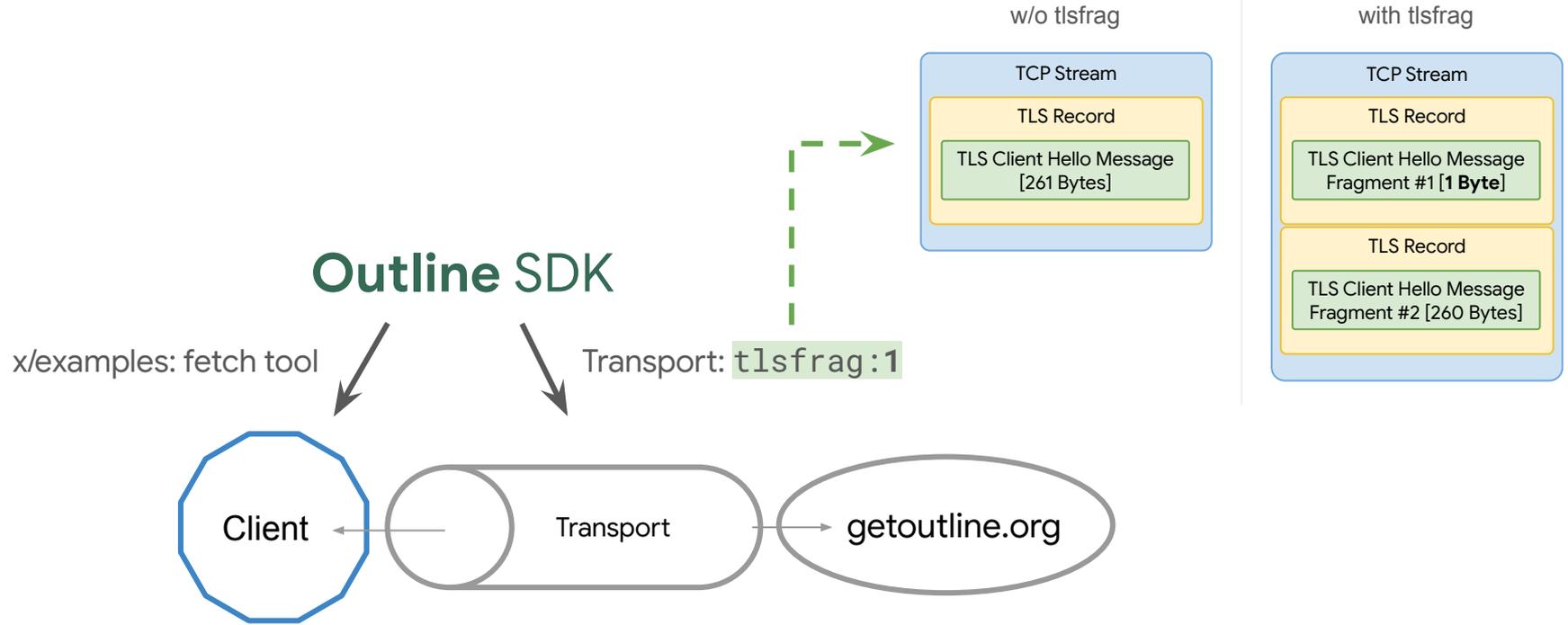
# Demo: Proxy-based Strategy



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# Demo: Proxy-less Strategy



# Outline SDK

Interested?

Follow our development on  
Github and ask questions in  
our discussion forum:

<https://github.com/Jigsaw-Code/outline-sdk>

<https://github.com/Jigsaw-Code/outline-sdk/discussions>

-  **Go for beginners: Getting started**  
[jyyi1](#) started on Sep 11 in [Tutorials](#)
-  **New Feature: TLS Transport**  
[fortuna](#) announced on Oct 31 in [Announcements](#)
-  **New Documentation: Config-based dialers**  
[fortuna](#) announced on Oct 31 in [Announcements](#)
-  **Example: Outline VPN command-line app**  
[jyyi1](#) started on Aug 11 in [Show and tell](#)
-  **New Feature: Mobile Proxy**  
[fortuna](#) announced on Oct 17 in [Announcements](#)
-  **Example Cross-Platform Application for testing Connectivity!**  
[daniellacosse](#) started on Aug 11 in [Show and tell](#)

# Recap

**Outline VPN** for you, your contacts and your audience

- [getoutline.org](https://getoutline.org)

**Outline SDK** for your apps, your research

- [github.com/Jigsaw-Code/outline-sdk](https://github.com/Jigsaw-Code/outline-sdk)