TOR Network
Overview

- Creation and history of TOR
- Usage
- How it works
- Design goals
- Vulnerabilities
A Brief History

● **1996** - Onion Routing
  ○ NRL employees Paul Syverson, Michael G. Reed, David Goldschlag

● **1998** - Proof-of-concept code

● **2000** - Generation 0 code decommissioned
  ○ Roger Dingledine (MIT), Nick Mathewson and Paul Syverson continue developing generation 1 code with the support of DARPA and NRL

● **2003** - Tor Alpha released

● **2006** - Tor Project Company
Onion Routing and Tor

- **Onion Routing is a networking mechanism which:**
  - Makes sure content are encrypted
  - Hides who is communicating with whom during the process

- **Tor is a third generation onion routing system**
  - Allows users access information safely and anonymously
  - The architecture relies on the computers volunteers and sponsors. When user join the Tor Network, they can contribute to the community by becoming relay or a bridge in the system

- **Two types of users**
  - Government, Intelligence agency, Military
  - The public, journalists and who claims different politics ideas
How Tor works

Step 1: Alice’s Tor client obtains a list of Tor nodes from a directory server.
How Tor works

Step 2: Alice’s Tor client picks a random path to destination server. Green links are encrypted, red links are in the clear.
How Tor works

Step 3: If at a later time, the user visits another site, Alice's Tor client selects a second random path. Again, green links are encrypted, red links are in the clear.
Design Goals

- Deployability
  - Inexpensive, light burden
- Usability
  - Easily implementable
- Flexibility
- Simple Design
Possible Attacks/ Vulnerabilities

- Passive Attacks
  - End-to-end timing correlation

- Active Attacks
  - Compromise Keys, replay attack, hostile OR

- Directory Attacks
  - Subvert a majority of directory servers

- Attacks against Rendezvous Points
  - Introduction requests, attack on an introduction point

- Other Vulnerabilities
Questions?
Sources

https://www.expressvpn.com/internet-privacy/tor/history/


https://www.onion-router.net/Publications/tor-design.pdf

https://www.torproject.org/about

https://epub.uni-regensburg.de/11919/1/authorsversion-ccsw09.pdf