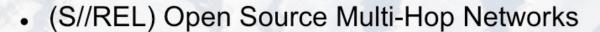
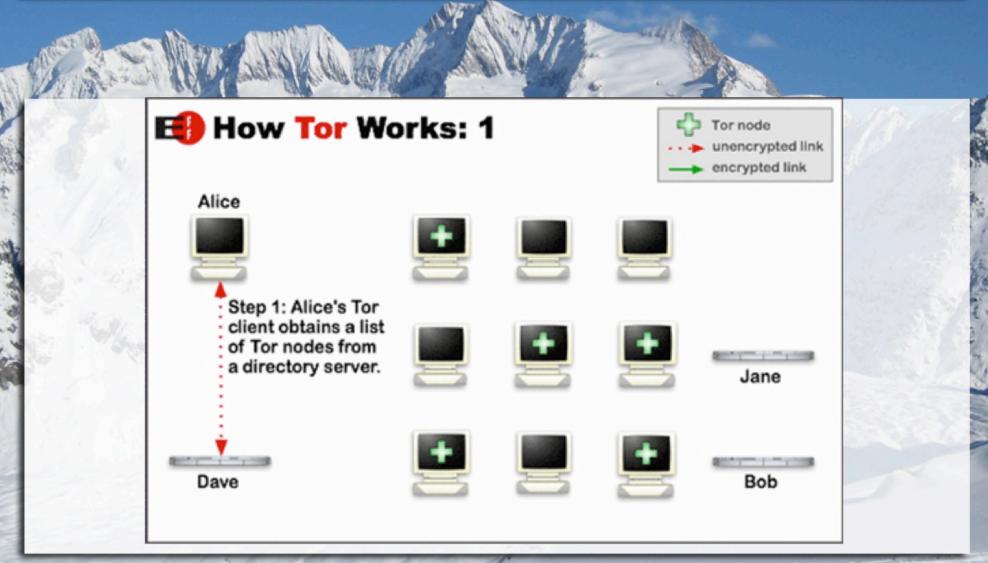
TOP SECRET//SI//REL TO USA, FVEY (C//REL) Types of IAT – Advanced Open Source Multi-Hop

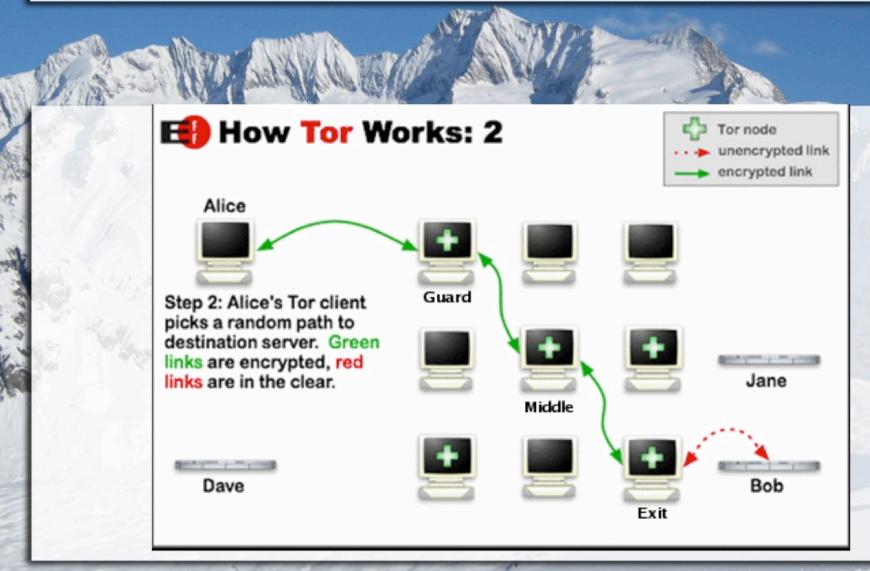


- (S//REL) Tor
- (S//REL) Very widely used worldwide
- (S//REL) Open Source
 - (S//REL) Active Development
 - (S//REL) Mitigates Threats
- (S//REL) Very Secure
- (S//REL) Low enough latency for most TCP uses
- (S//REL) Still the King of high secure, low latency Internet Anonymity
 - (S//REL) There are no contenders for the throne in waiting

TOP SECRET//SI//REL TO USA, FVEY (S//REL) *Tor* Operation (1)



TOP SECRET//SI//REL TO USA, FVEY (S//REL) *Tor* Operation (2)



TOP SECRET//SI//REL TO USA, FVEY

(S//SI//REL) Passive *Tor* Traffic Analysis

- (S//SI//REL) For Normal SIGINT flow, need to identify Tor traffic!
 - (S//SI//REL) Only outer TLS layer visible → How to Distinguish?
 - (S//SI//REL) Tor developers attempt to remain anonymous by blending in with myriad other TLS traffic
 - (S//SI//REL) Tor TLS has changed over the years
 - (S//SI//REL) There ARE some server → client features which are recognizable
 - (S//SI//REL) Certificate: Specific Diffie-Hellman (DH) Modulus byte search
 - (S//SI//REL) Certificate: Issuer and Subject random names of same form ex:
 CN=www.ofzfkdjxvrss.net regex match
 - (S//SI//REL) Certificate: always 2 hour lifetime ASN.1 parsing, more computation
 - (S//SI) Multiple XKS fingerprints from multiple parties deployed

(S//REL) Tor Project Censorship Driven Activity

- (S//REL) Driven by Censorship Circumvention, Hide Signature
 - (S//REL) China and Iran still main adversaries
 - (S//REL) Researching better bridge distribution strategies
 - (S//REL) Claim by Tor Project is 8000 requests/day for <1000 total
 - (S//REL) Around Feb 2011, changed the TLS handshake
 - (S//REL) Signature more like Apache web-server
 - (S//REL) Different DH Modulus
 - (S//SI//REL) New XKS Signatures address this
 - (TS//SI//REL) Proposed eventual change will kill identification!
 - (S//REL) Each Tor node will generate random-ish signatures in a volatile way specifically designed to look like normal website TLS traffic!

TOP SECRET//SI//REL TO USA, FVEY (S//REL) Censorship Driven Protocol Obfuscation – Psiphon 3 / Tor



(S//REL) Extreme Censorship blocking: Common encrypted protocols

- (S//REL) In the case of Psiphon 3: SSH
- (S//REL) In the case of Tor: TLS
- (S//REL) Make deep packet inspection (XKS:-)) work harder
- (S//REL) Both use work of a open source project (brl/obfuscated-openssh)

(S//REL) Idea is both sides transmit random seed and verifier information

- (S//REL) Verifier is hash of seed and other data
- (S//REL) If verifier passes data used from both side seeds to generate key
- (S//REL) Key used in symmetric cipher to encrypt native SSH or SSL protocol
- (S//REL) So for random stream, need to de-obfuscate and test for SSH / SSL

(S//REL) Details for Psiphon 3

- (S//REL) Hash used for verifier, key generation: 6000 iterations SHA-1
- (S//REL) Symmetric cipher is RC-4

(S//REL) Details for Tor Obsfproxy

- (S//REL) Hash used for verifier, key generation: 100K iterations SHA-256
- (S//REL) Symmetric cipher is AES-CTR-128
- (S//REL) Key uses seed from both sides!

(S//REL) Tor Project and friends Recent Activity

(S//REL) Tor on non-traditional platforms

- (S//REL) ORBOT, Tor for Android smartphones Associated browser, easy to use!
- (S//REL) Tor Router Project Modified Linksys Router (everything over Tor)
- (S//REL) Hide-My-IP-Address
 - (S//REL) Proprietary replacement for Tor Browser Bundle
 - (S//REL) From "WCCL Network" not part of Tor Project
 - (S//SI//REL) Looked at based on reference by CT target
- (S//REL) Tor Project working on improving support for circumvention
 - » (S//REL) Handshake obfuscation (discussed)
 - » (S//REL) Better bridge proliferation / distribution
- (S//REL) Tails: Complete Bootable OS on CD for anonymity includes Tor
 - (S//REL) Adds Severe CNE misery to equation
 - (S//SI//REL) Has been discussed by CT targets

(S//REL) Tor Project and friends Recent Activity

- (S//REL) Advanced Tor "Obfuscation" Project: SkypeMorph
 - (S//REL) Another option for pluggable transport
 - (S//REL) More sophisticated concept than Obfsproxy
 - (S//REL) Open connection to Skype server with "bridge Skype ID"
 - (S//REL) Encapsulate Tor in encrypted data mimicking Skype Video Traffic
 - (S//REL) Sort of traffic flow steganography vice content steganography
 - (S//REL) True Public Key cryptography vice obfuscation with known key
 - (S//REL) Product of University research Non-trivial to deploy
- (TS//SI//REL) Most Recent SIGINT Work on Exploiting Tor
 - (TS//SI//REL) REMATION II Workshop (US/UK) at MHS spring 2012
 - (S//SI//REL) Unleashed Networking/CNE legions...
 - (S//REL) See later talk by

(S//REL) Tor Project and friends Recent Activity

•(S//REL) Online Feud between 2 IAT Products: Ultrasurf and Tor

- (S//REL) "Technical Analysis of the Ultrasurf proxying software" (Applebaum)
 - (S//REL) Analysis (including some SRE) highly critical
 - (S//REL) Single hop, controlled by one authority
 - (S//REL) Security by obscurity
 - (S//REL) No perfect forward secrecy (forensic traces exploitable)
 - (S//REL) Responsible Disclosure: Ultrasurf notified 12/2011, published 04/2012
- (S//REL) "Tor's critique of Ultrasurf: A reply from the Ultrasurf developers"
 - » (S//REL) Posted on Ultrasurf site days after Tor published critique
 - » (S//REL) All talk and no show
 - » (S//REL) Not fully analyzed
 - » (S//REL) One Approach to IAT: Tor higher anonymity, smaller scale
 - » (S//REL) One Approach to IAT: Ultrasurf focus on circumvention, massive scale