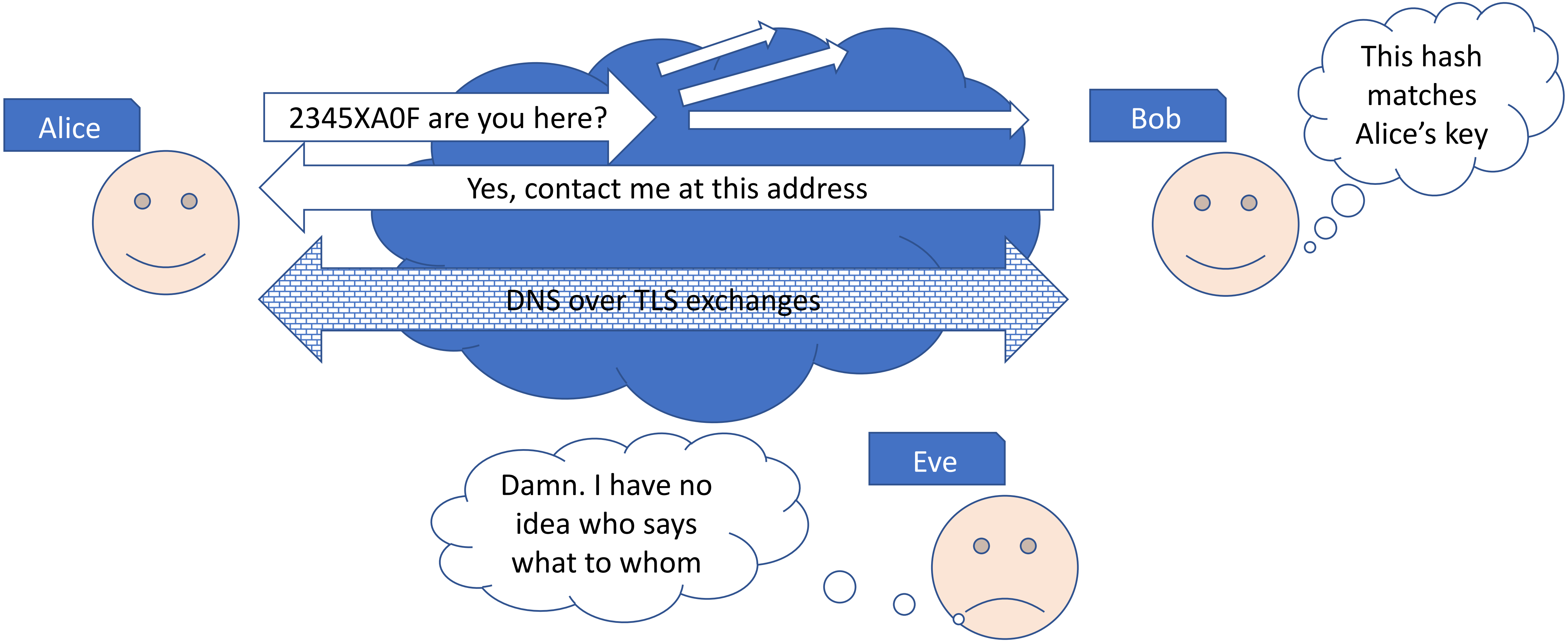
DNSSD Privacy & DNSSD Pairing

Christian Huitema, Daniel Kaiser

draft-ietf-dnssd-privacy-02, draft-ietf-dnssd-pairing-02

IETF 99, Prague, July 2017

DNS-SD Privacy summary


Alice
2345XA0F are you here?
Yes, contact me at this address
DNS over TLS exchanges
Bob
This hash matches Alice’s key
Eve
Damn. I have no idea who says what to whom

DNS SD Privacy

- Prototype implementation
- WGLC, Reviews
  - Stephane Borzmeyer
  - Ted Lemon
- Revision -02
  - Answers Stephane’s review

Issue: Use of PSK

- Issue:
  - Design uses shared secrets between pairs of nodes
  - Why not use a public key solution instead?
- Rationale
  - Public key is a unique identifier
  - Public key of server is disclosed during TLS handshake => Leak!
  - PSK provides implicit client authentication, access control
- Proposed Resolution
  - Will check the design section to ensure that the rationale is clearly explained.

Issue: Time synchronization

- Issue:
  - Nodes publish instance name = hash (24 bit time, shared secret)
  - This requires synchronization to about 4 minute interval
    - Time based nonce controls computing load, mitigates DOS attacks
  - What about the edges of the interval?
- Mitigation implemented in prototypes
  - Accept both current and previous or next nonce
- Resolution
  - Better documentation of edge condition in draft-02

Issue: Time based token and DNS-SD

- Issue
  - Token based on 256 seconds intervals
    - Short interval limits the time opportunity for replay attacks
  - Requires explicit DNS-SD updates every 256 seconds
  - May cause too much load on DNS servers
- Suggested Mitigation (Ted)
  - Specify a longer interval, e.g., 32,768 seconds (about 30minutes)
  - Would still mitigate replay attacks “somewhat”
- Resolution
  - Maybe. Discuss.

Issue: list of ID and fingerprinting

- Issue
  - Each node publishes as many instances as it has pairings
  - Counting the number of instances may allow fingerprinting
- Mitigation tried in prototypes
  - Pad with fake instances
  - Minimal cost for peers who will not resolve the fake instance names
- Proposed resolution
  - Document attack and mitigation in security section

Issue: hostname versus service name

- Issue
  - Draft specifies DNS-SD based discovery, using instance names
  - Many services such as SSH just use host name and port, won’t work easily
- Mitigation, implemented in prototype
  - Perform discovery of the private discovery service
  - Once discovered, securely resolve hostname._private.local
  - Cache results to allow connections to hostname:port
- Proposed resolution
  - Document host name caching?

DNS SD Pairing

- Discovery
  - Potential peers discover each other
  - Two methods: MDNS or QR code
- Key agreement
  - Establish TLS connection using TLS and [EC]DH Anon
  - Each node exports the key from TLS context
- Verification to defeat MITM
  - Commit hash(nonce), compute short string = hash(nonce, key)
  - Verify same string displayed on both sides (text or QR code)
- Remember the secret associated with the pairing

DNS SD Privacy

- Prototype implementation
- WGLC, Reviews
  - Thanks, Ted.
- Revision -02
  - Clarifications

- Review issues:
  - Clarify discovery (SRV/TXT for presence service)
  - QR code
  - Separate analysis and spec

Issue: separate QR code specification

- Issue
  - Draft specifies QR code option as alternative for discovery and verification
  - “This feels like a separate protocol”
- Motivation
  - QR code verification is widely used in existing systems, e.g. Signal app
- Proposed resolution
  - Need feedback from the list
  - Could move QR code verification to separate document

Issue: separate analysis and text

- Issue:
  - Pairing draft includes lengthy discussion of requirements and potential solution
  - Results in large document, when spec itself is fairly short
  - Implementers more comfortable with short spec
  - Separate analysis could be reused by HomeNet
- Proposed resolution, pending WG agreement
  - Split pairing into two drafts, informational analysis and standard track protocol

Next steps?

- Private discovery passed WGLC, is ready
- Pairing passed WGLC but
  - Could split analysis, specification, and QR code
  - Would probably need second WGLC for pairing