Bootstrapping Key Infrastructure over EAP
draft-lear-eap-teap-brski

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Cisco

Related Draft

BRSKI over IEEE 802.11

draft-friel-brski-over-802dot11

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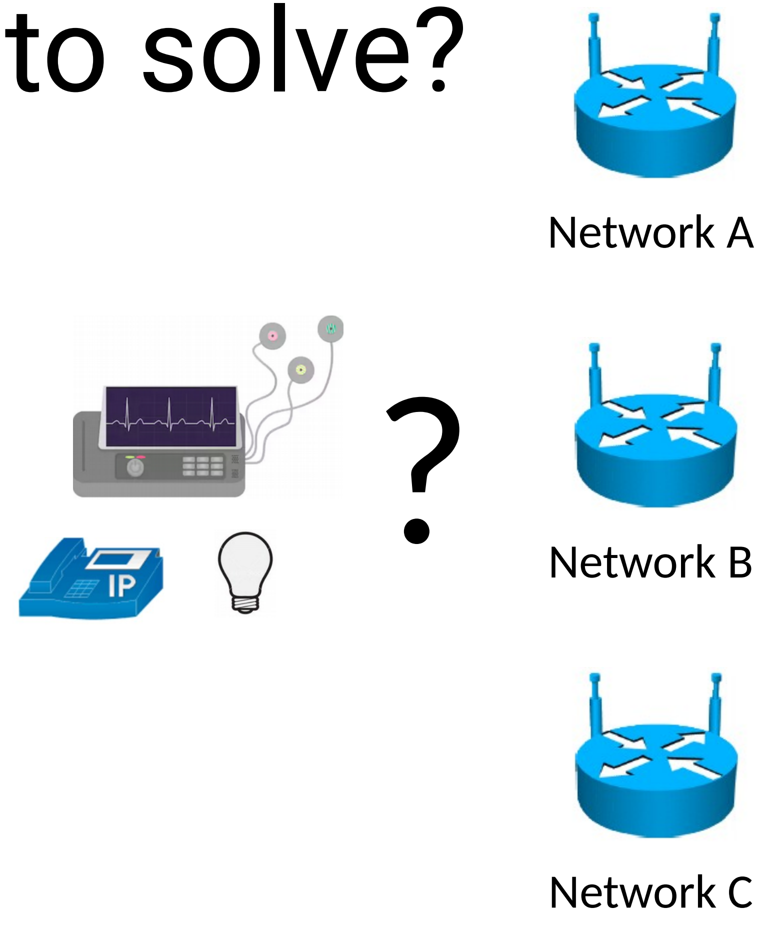
What problems are we trying to solve?

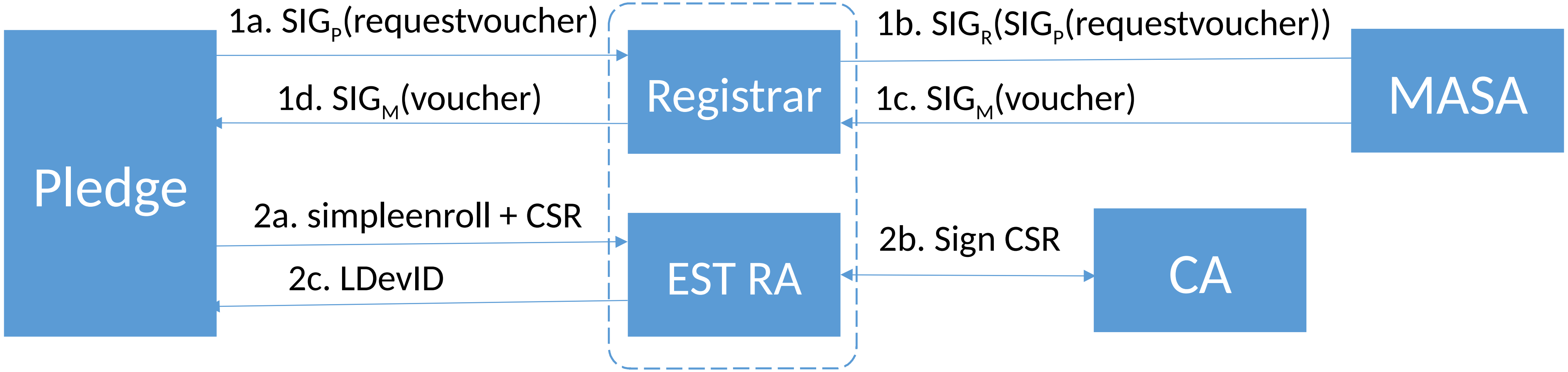
- What Wi-Fi networks support BRSKI?
- How to avoid the device onboarding against the wrong network?
- What credentials does the device use before and after BRSKI bootstrap against a Wi-Fi network?
- How long does it take / what signalling is required for the device to determine that the network is untrusted?
- How complicated is the device state machine when switching from candidate network A to candidate network B?
- How complicated is the device state machine during network onboarding?



draft-friel-brski-over-802dot11 outlines some possible solutions but does **not** make any final recommendations

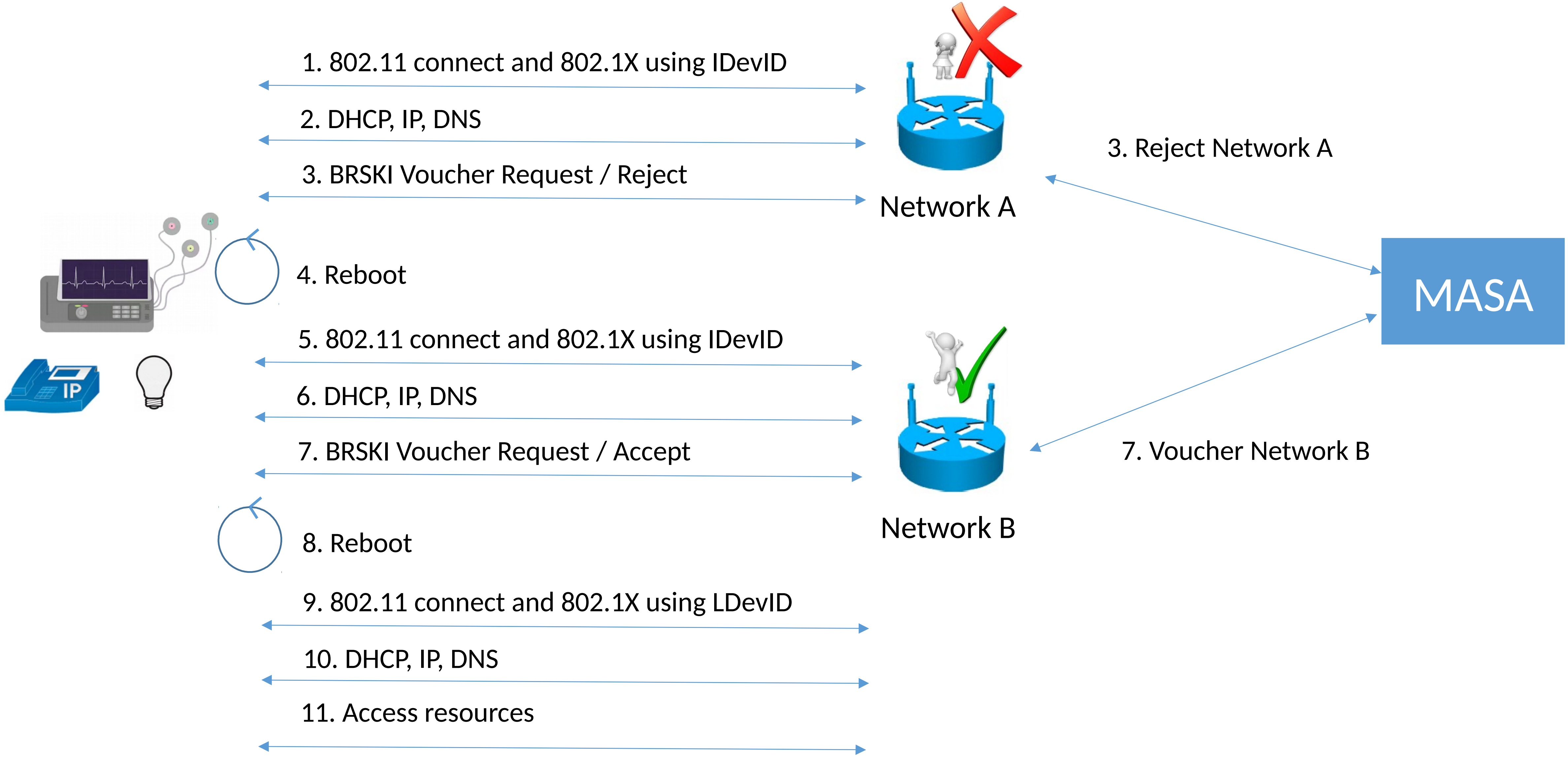
draft-lear-eap-teap-brski focuses on one candidate solution: running BRSKI inside a TEAP tunnel

Refresher: ANIMA BRSKI



- Bootstrapping pledge trusts nothing except the manufacturer
- Pledge discovers registrar service on local domain (GRASP, mDNS, DNS options)
- Registrar is akin to a smart middlebox that proxies voucher requests to a manufacturer service that the device trusts
- Manufacturer issues a signed voucher instructing the pledge to trust the registrar

What we *could* do with current mechanisms



1. 802.11 connect and 802.1X using IDevID

2. DHCP, IP, DNS

3. BRSKI Voucher Request / Reject

4. Reboot

5. 802.11 connect and 802.1X using IDevID

6. DHCP, IP, DNS

7. BRSKI Voucher Request / Accept

8. Reboot

9. 802.11 connect and 802.1X using LDevID

10. DHCP, IP, DNS

11. Access resources

Network A

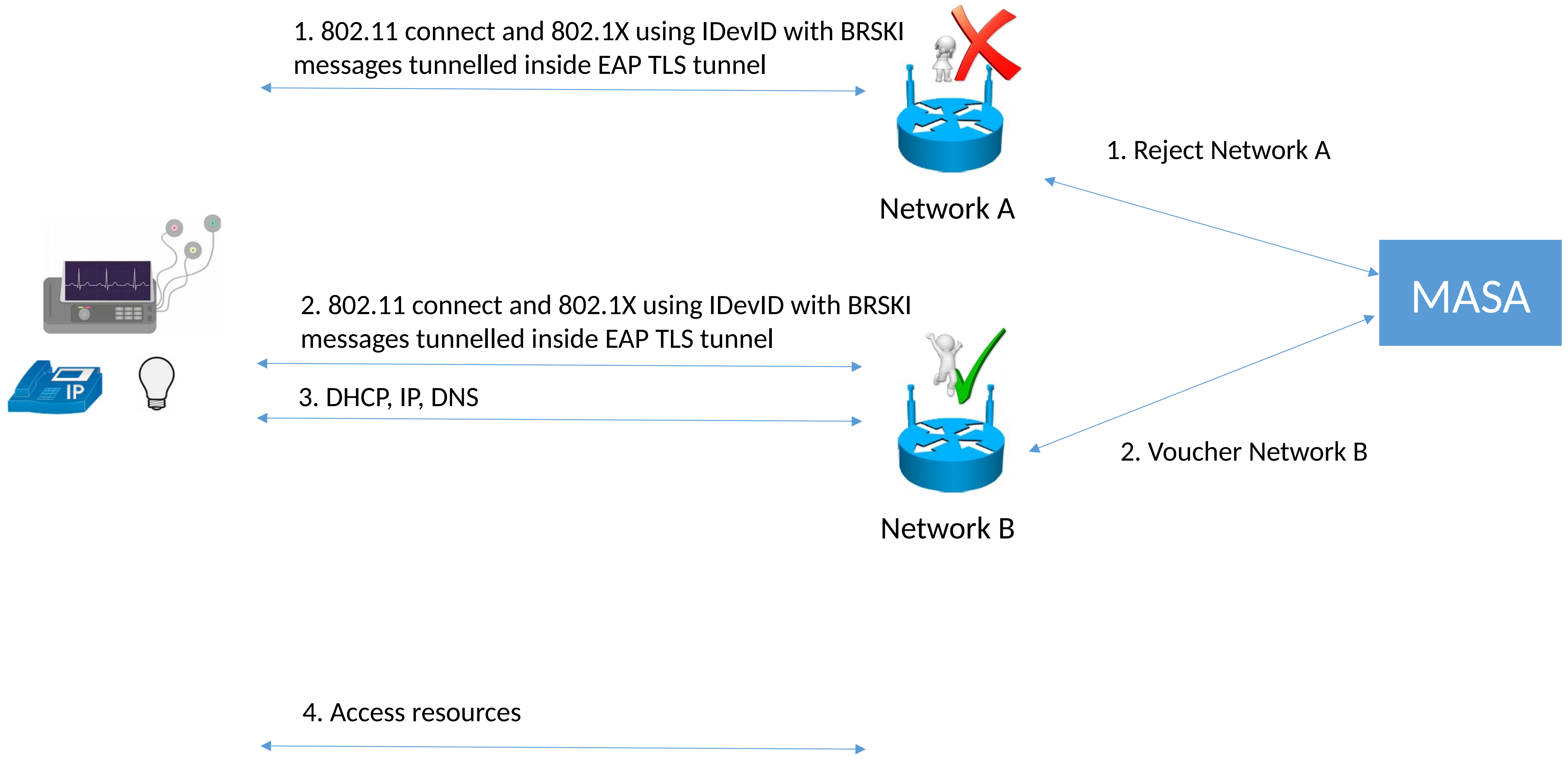
3. Reject Network A

MASA

7. Voucher Network B

Network B

What we *would like* to do



1. 802.11 connect and 802.1X using IDevID with BRSKI messages tunnelled inside EAP TLS tunnel

1. Reject Network A

Network A

MASA

2. 802.11 connect and 802.1X using IDevID with BRSKI messages tunnelled inside EAP TLS tunnel

3. DHCP, IP, DNS

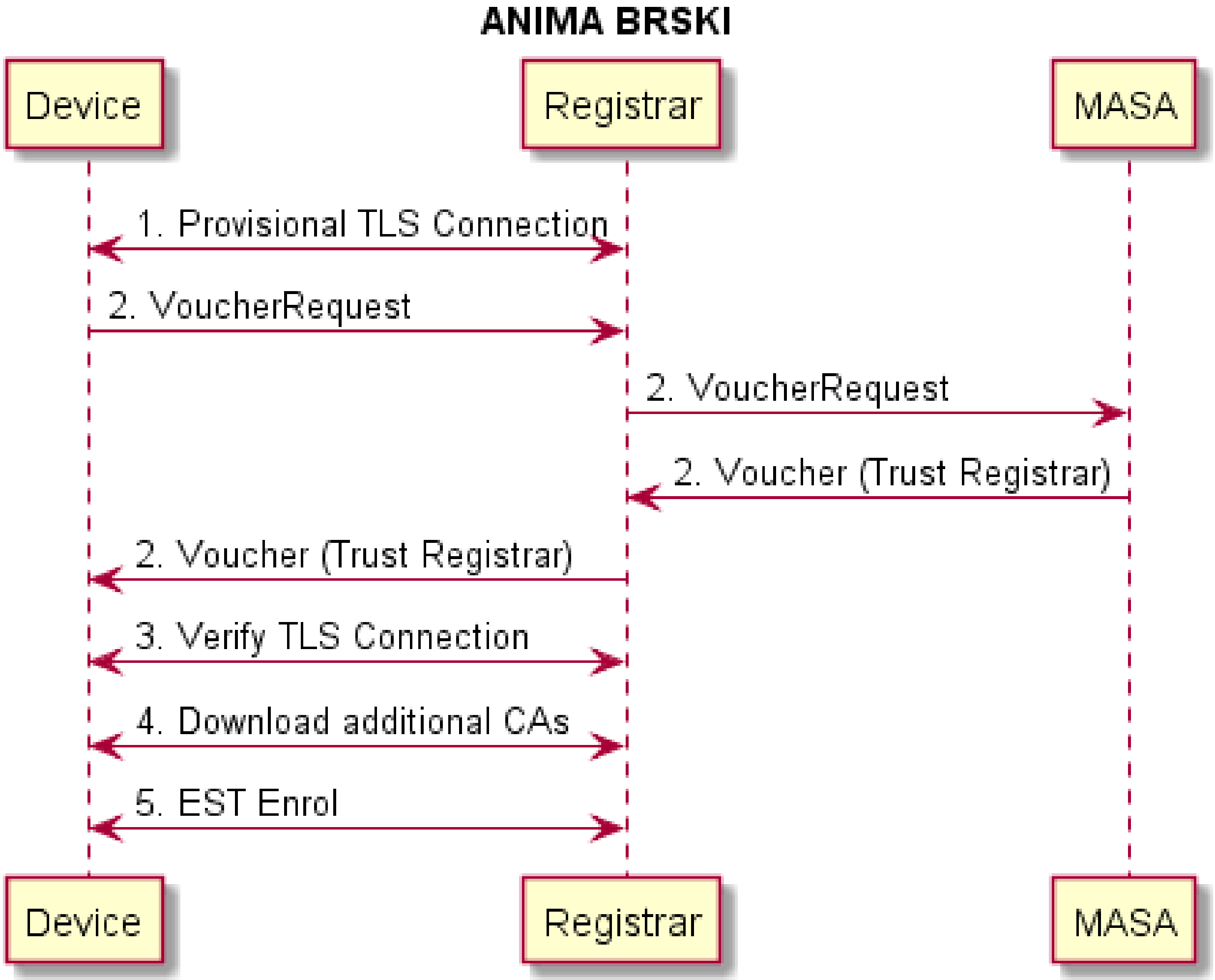
2. Voucher Network B

Network B

4. Access resources

ANIMA BRSKI

1. Provisional TLS connection to Registrar
2. Establish Trust via Voucher
3. Verify TLS connection
4. Download Trust Anchors
5. Enrol to get a cert

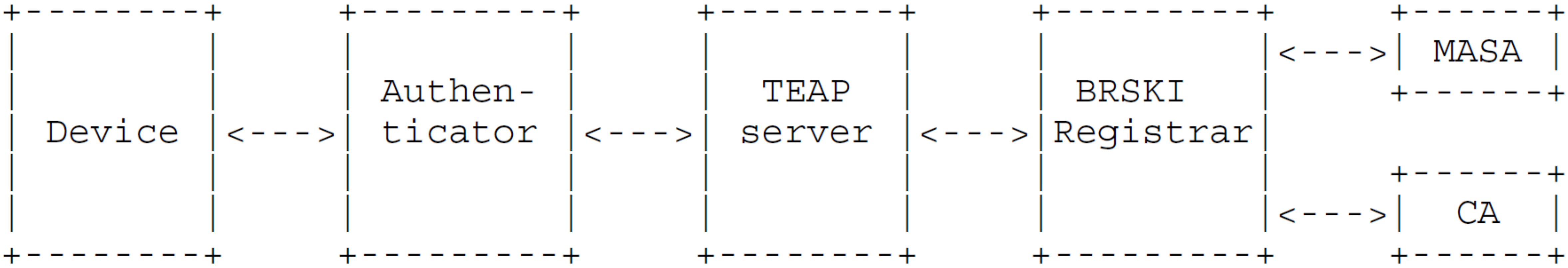


EAP-TEAP is a good fit

1. Provisional TLS connection to Registrar
2. Establish Trust via Voucher
3. Verify TLS connection
4. Download Trust Anchors
5. Enrol to get a cert

1. TEAP supports Server Unauthenticated Provisioning
2. New TLVs can be transported in TLS tunnel
3. Device can verify server after TEAP Phase 2 completes
4. Trusted-Server-Root TLV exists
5. PKCS#7 and PKCS#10 TLVs exist

EAP-TEAP BRSKI Architecture



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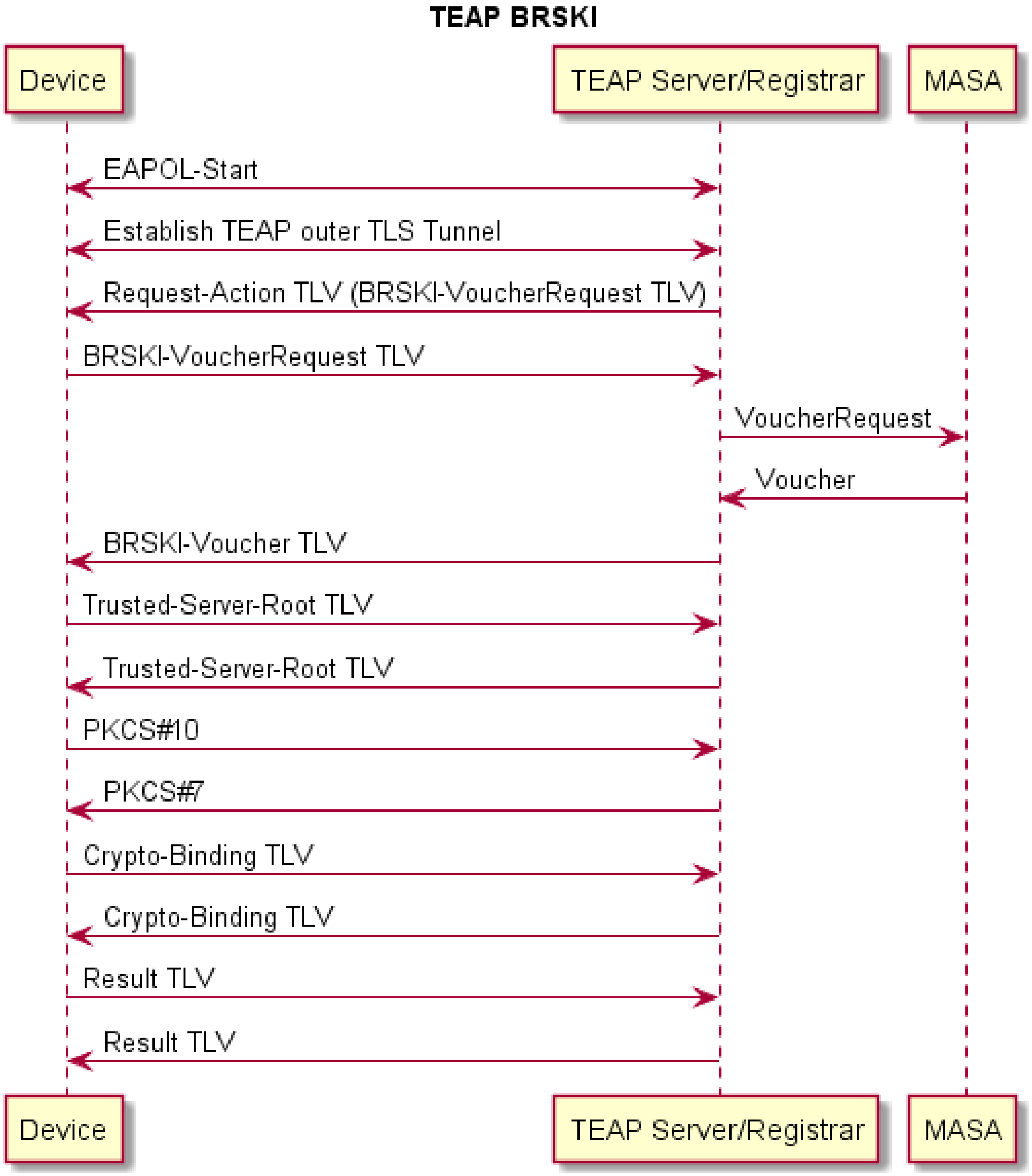
+---------+     +----------+     +---------+     +----------+     +-------+
|         |     |          |     |         |     |          |<--->| MASA  |
|         |     | Authen-  |     |  TEAP   |     |  BRSKI   |     +-------+
| Device  |<--->| ticator  |<--->| server  |<--->|Registrar |
|         |     |          |     |         |     |          |     +-------+
|         |     |          |     |         |     |          |<--->|  CA   |
+---------+     +----------+     +---------+     +----------+     +-------+
```

- TEAP server and BRSKI Registrar could be co-located
- BRSKI Registrar and CA could be co-located

EAP-TEAP BRSKI Flow

- New TEAP TLVs defined
  - VoucherRequest
  - Voucher
  - VoucherStatus*
  - EnrollmentStatus*
  - CSR-Attributes*
- BRSKI TLVs must be exchanged prior to Crypto-Binding
- BRSKI is not a new EAP Method
  - BRSKI exchange is not an inner method
  - No need for Channel-Binding



* Usage shown in detailed flows in draft

Summary

- Running BRSKI as part of 802.1X simplifies device onboarding state machine
- EAP TEAP is a good fit for BRSKI
- Defining new TEAP TLVs vs. a new EAP method seems simpler
- Request EMU adoption for draft-lear-eap-teap-brski

Discussion