Crypto Binding Revisited
draft-hartman-emu-mutual-crypto-binding

EMU
IETF 83

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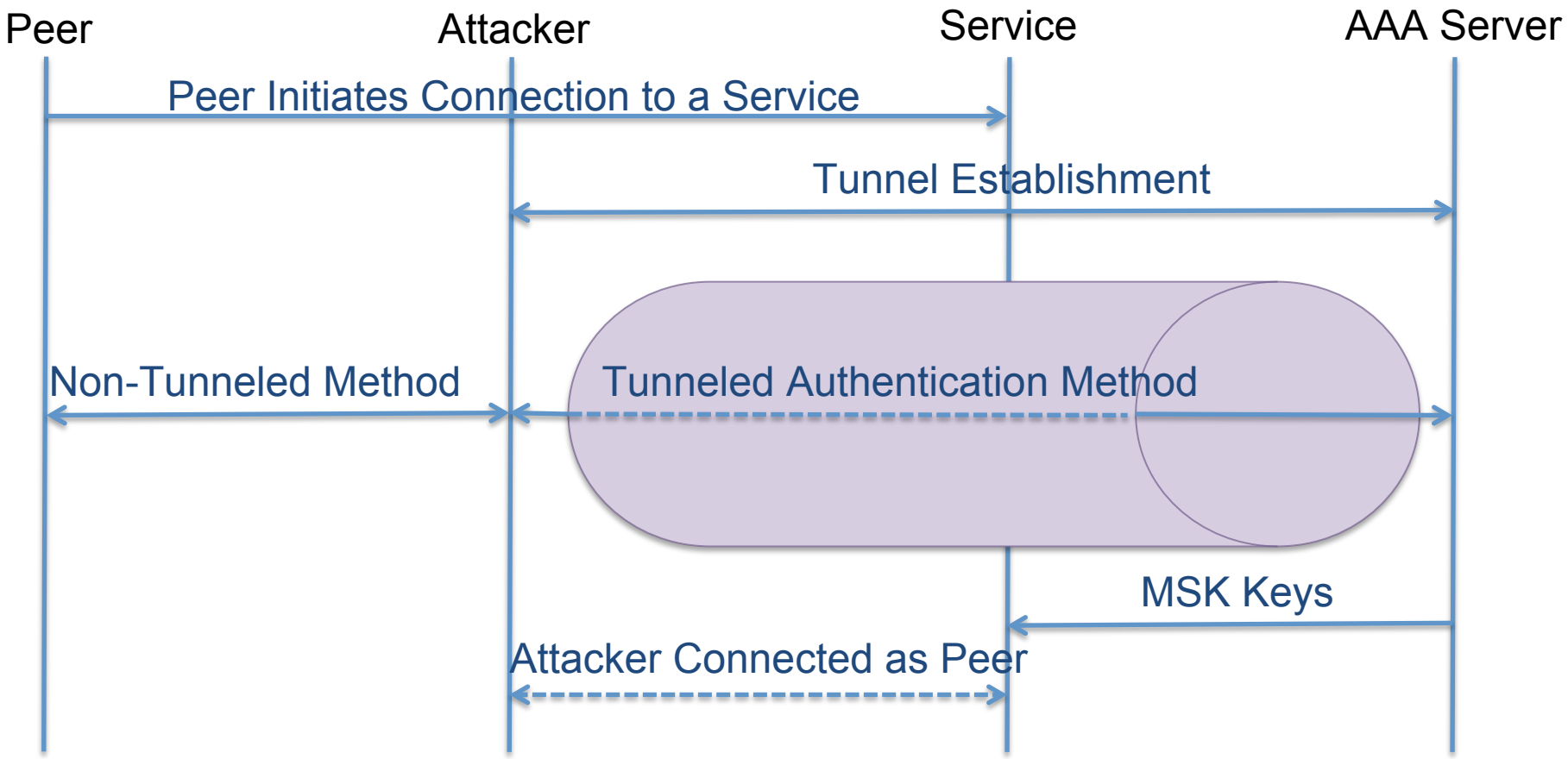
Trusting the EAP Server

- Today, peers typically place little trust in EAP server beyond protecting credentials
- Channel Bindings, NEA and future extensions trust information returned from the server
- Tunnels provide a way to integrate this into EAP

Tunnel Security

- Clients often use certificates to identify tunnel servers
  - Significant past focus on avoiding an attacker using a tunnel to capture the keys: tunnel MITM attack

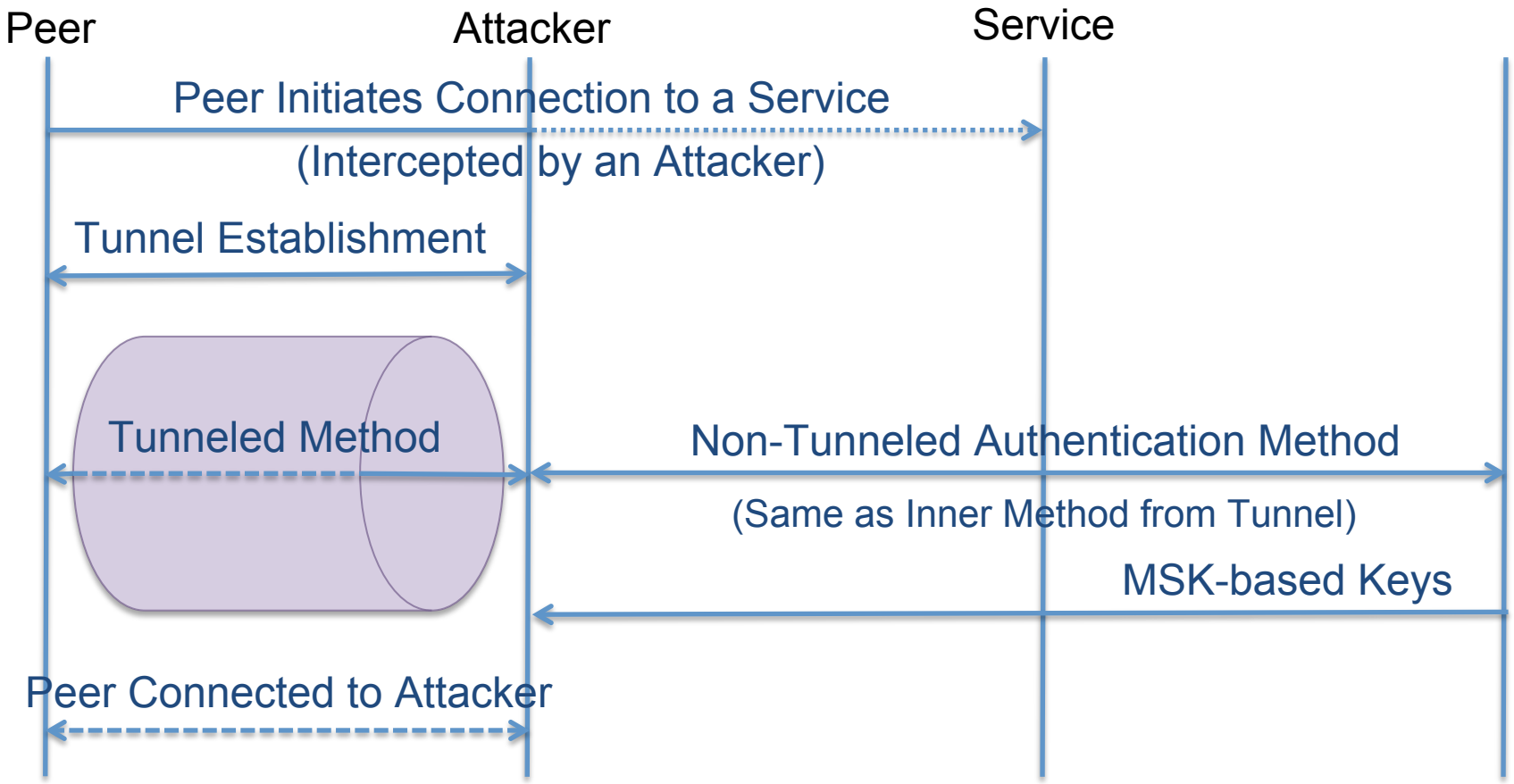
Classic Tunnel Attack



New Services and Tunnel Security

- Channel bindings extends the EAP threat model:
  - One NAS is not the same as another
  - We need the channel binding response from the right server
- Other new EAP services similarly involve the peer trusting the server

Server Insertion Attack



But we fixed this, right?

- Crypto binding solves this, right?
  - Crypto binding may not confirm server to peer
  - Besides we just gave the attacker the MSK which we'll use for crypto binding
- Certificates solve this?
- Policy solves this?

Pop Quiz: EAP and Certificates

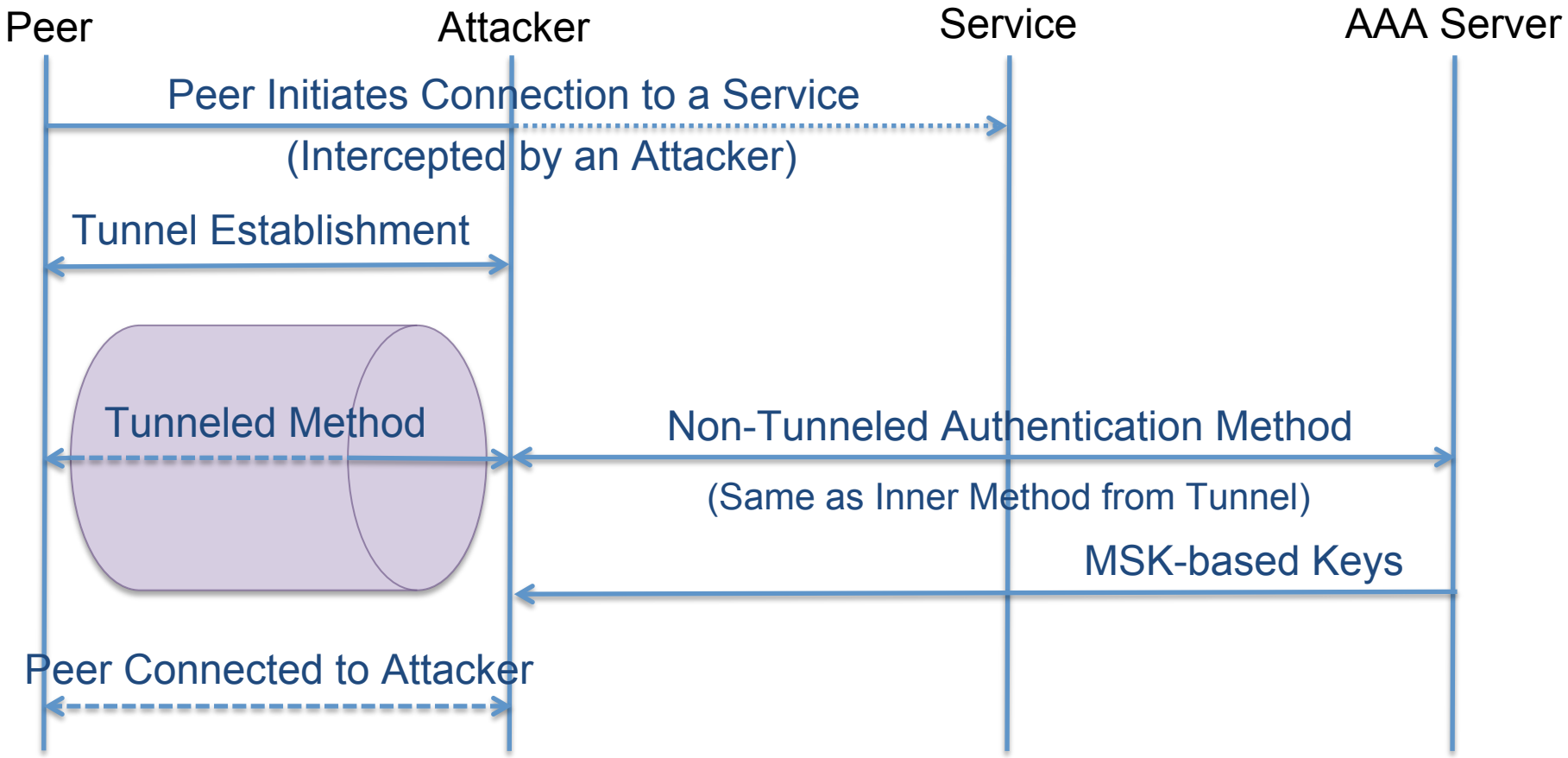
- Do all your EAP peers validate certificates back to a trust anchor?
- Do all your EAP peers know what subject name they expect in the certificate?
- Do your EAP peers rcheck to subject name?
- Yes to all questions is very rare

Challenges with EAP Certificate Validation

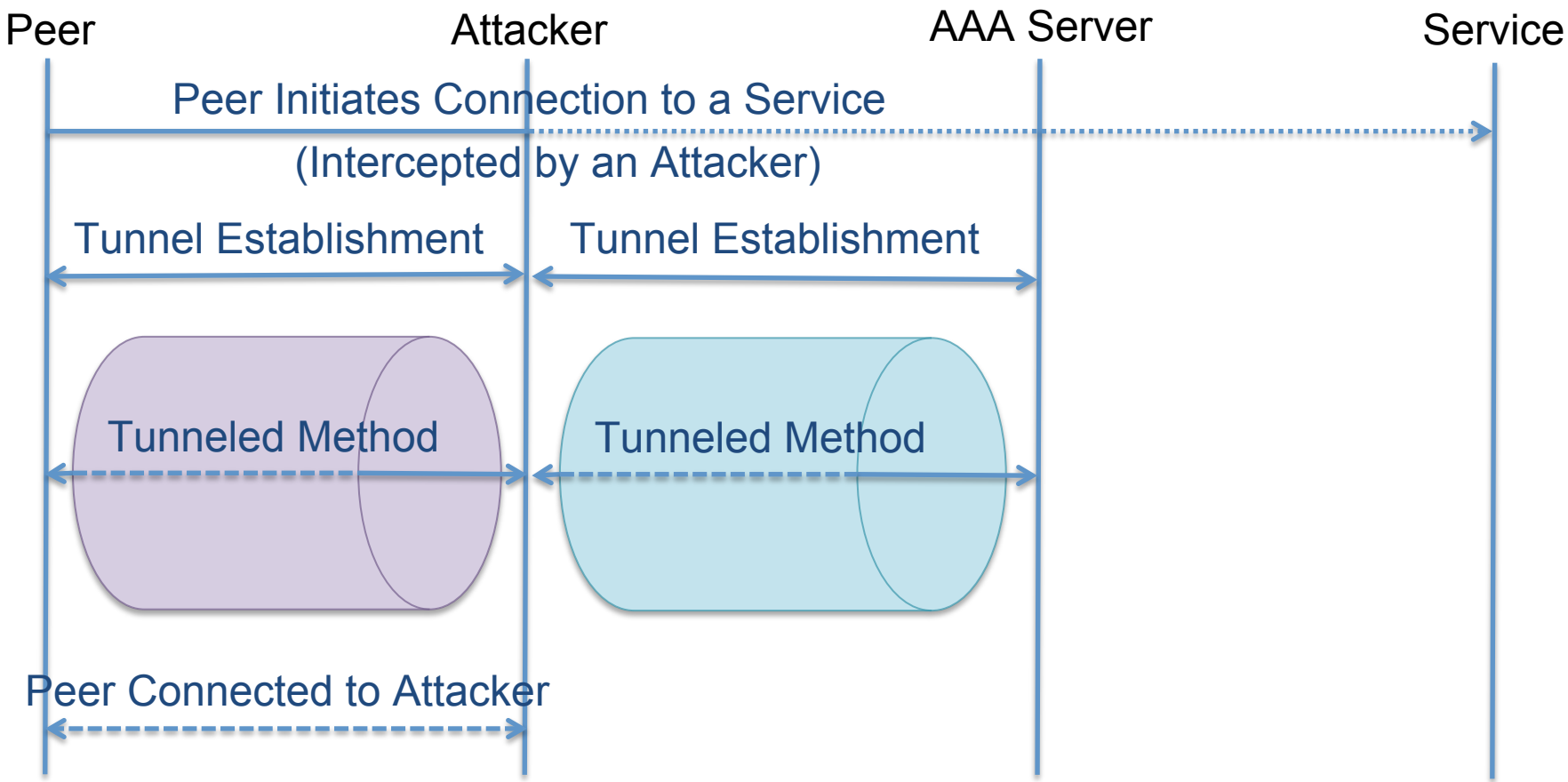
- Most EAP methods don't specify naming rules
- Certificate validation is only a SHOULD in many methods
- User interfaces make trust anchor configuration difficult

Policy Insufficient

Tunnel within Tunnel Attack



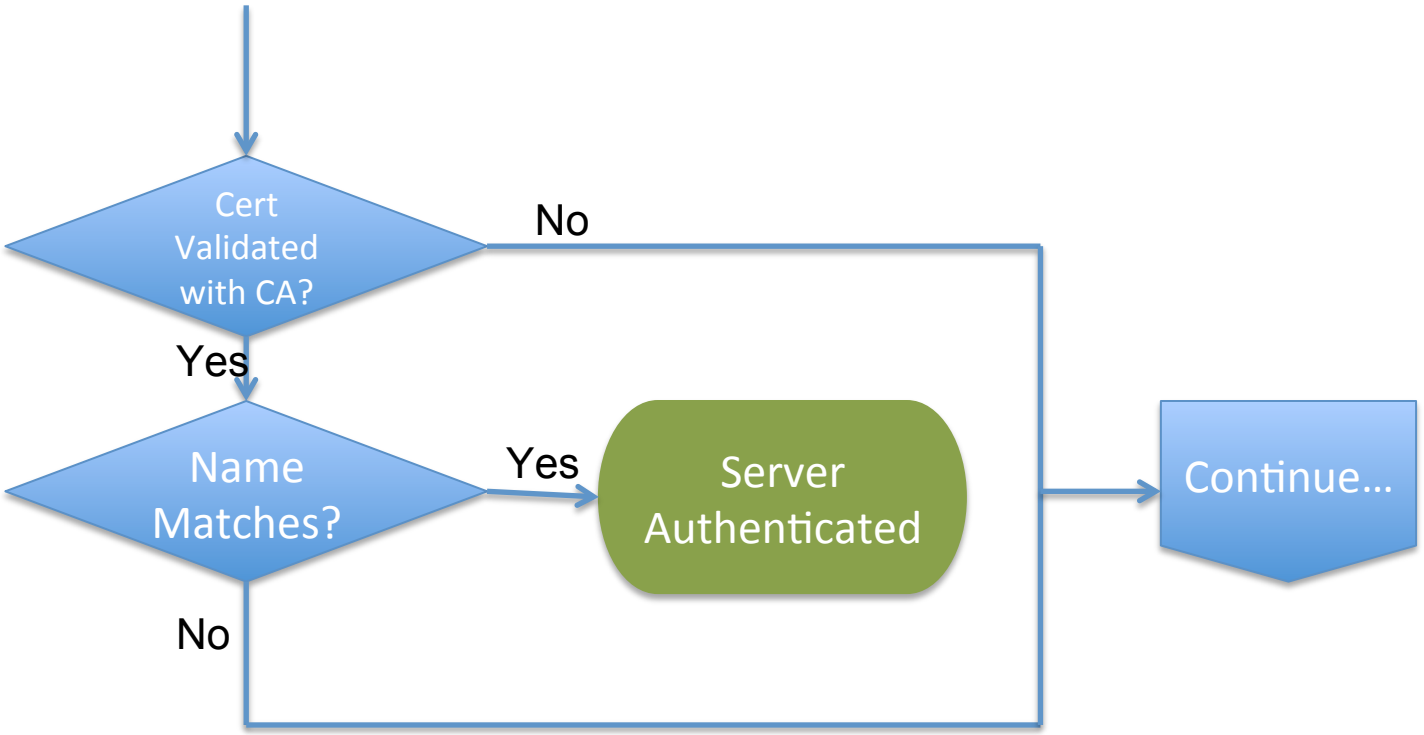
Tunnel to Tunnel Attack



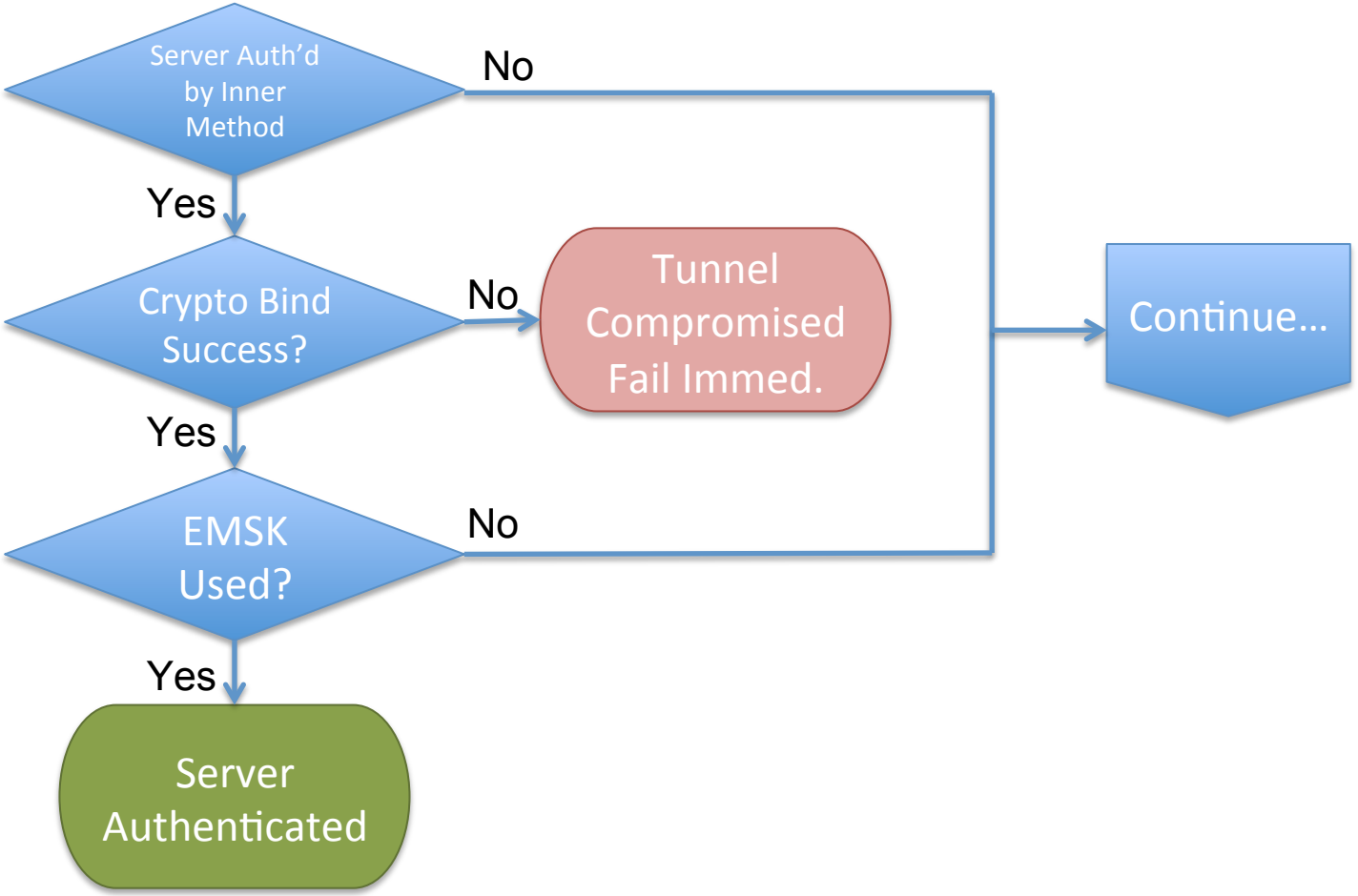
EMSK Crypto Binding

- The EMSK can be used to perform crypto binding
- Advantage: when it works provides transparent security with no additional config
- Only works with inner methods that support EMSK
- Not a complete solution

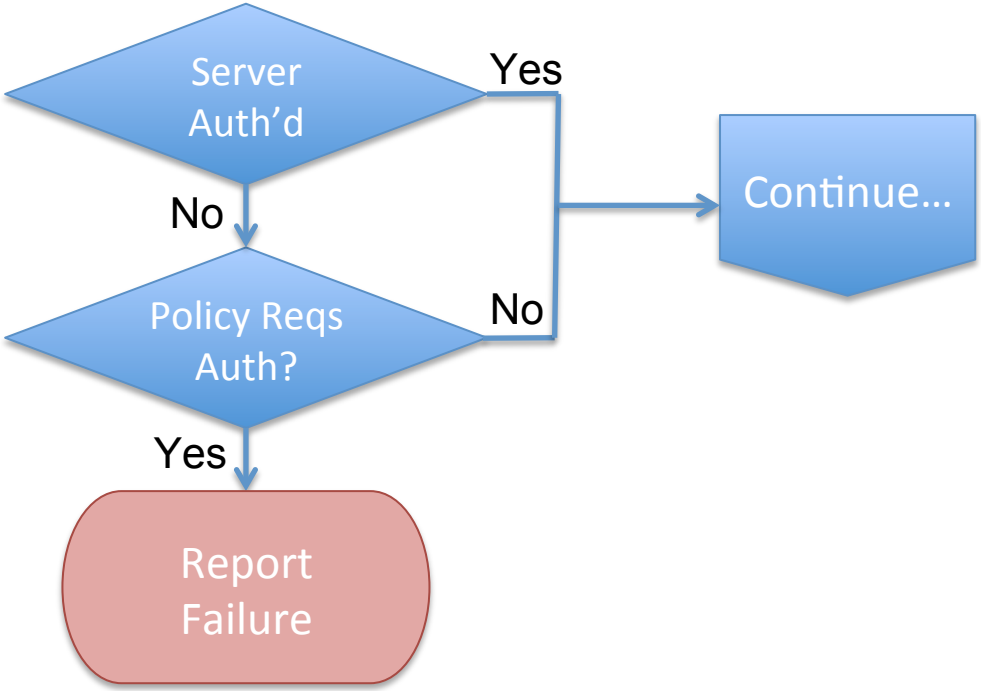
Server Certificate Received



Inner Method Succeeds



Server Authentication Required



Recommendations

- No one solution is sufficient
- Improve certificate handling
- Support EMSK crypto binding
- Find additional solutions

Feedback Desired

- Questions? Comments?
- Should we adopt draft-hartman-emu-mutual-crypto-binding to document this problem?