Formal verification of the 5G EAP-TLS authentication protocol using Proverif

2023

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Reference paper (DOI): 10.1109/ACCESS.2020.2969474

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- Based on applied π-calculus;

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phase t;                    (* execute a process in phase t *)
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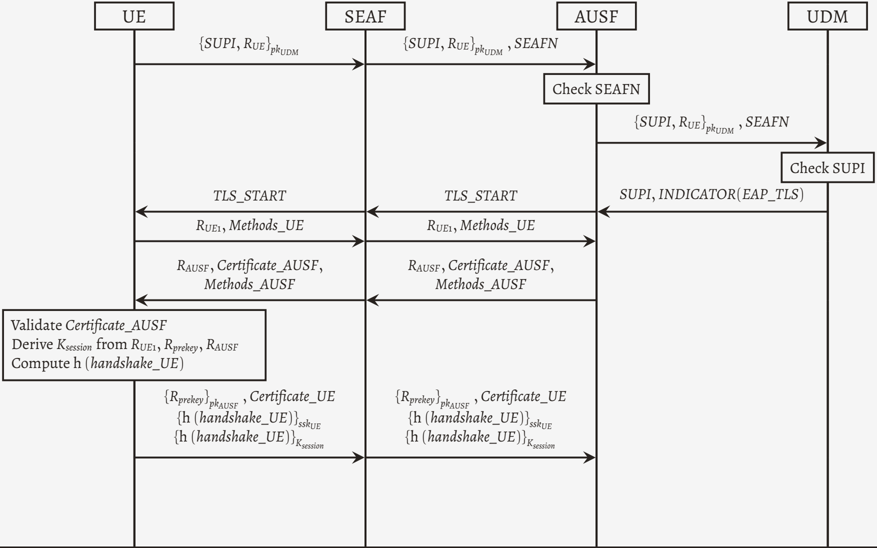
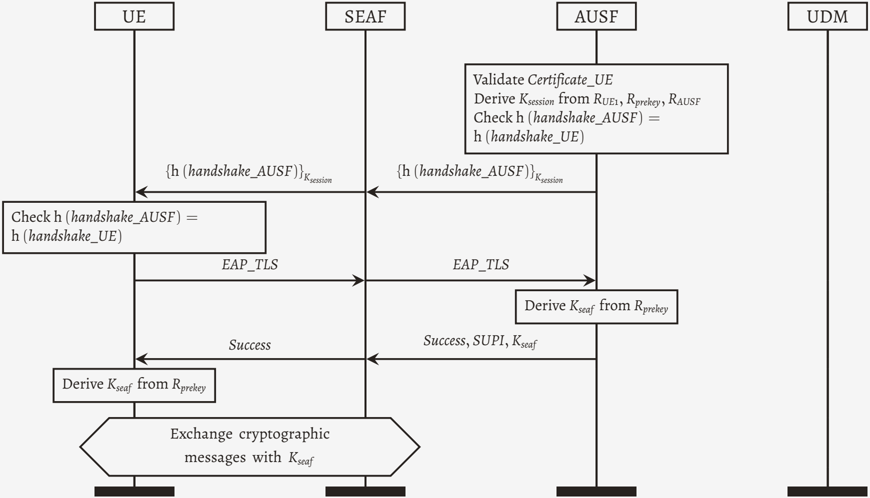
Assumptions:

- HN $\leftrightarrow$ SN communications are secure

5G EAP-TLS protocol execution I



5G EAP-TLS protocol execution II



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- **Secrecy properties**:
  - S1. The attacker cannot obtain the identity *SUPI* of an honest subscriber
  - S2. The attacker cannot obtain the pre-master key R_{prekey} of an honest subscriber
  - S3. The attacker cannot obtain the session key $K_{session}$ of an honest subscriber

It's ***DEMO*** time!!

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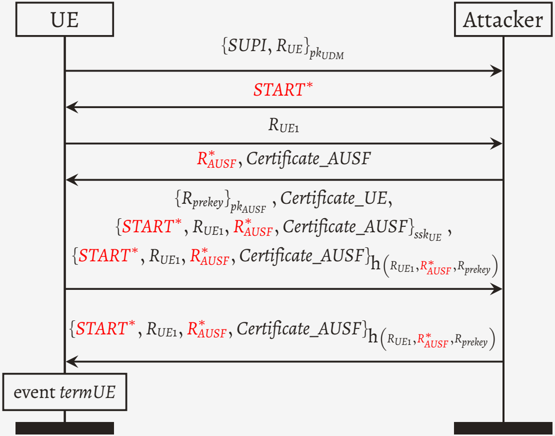
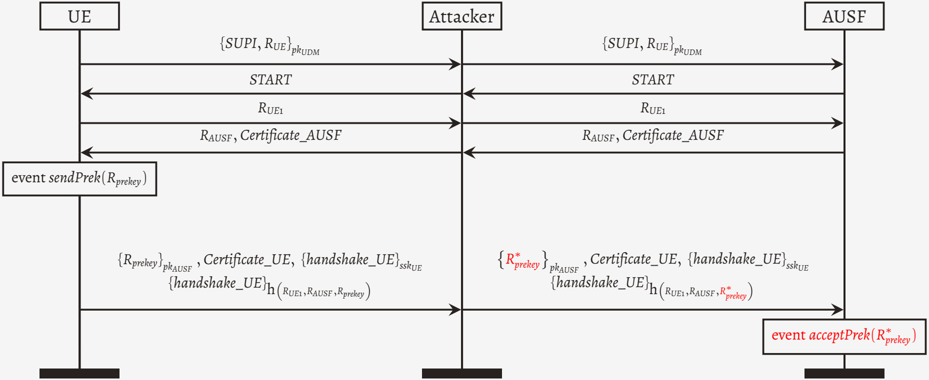
Counterexample for property A1



Counterexample for property A2



Fixing the protocol