Pre-authentication Problem Statement (draft-ohba-preauth-ps-01.txt)

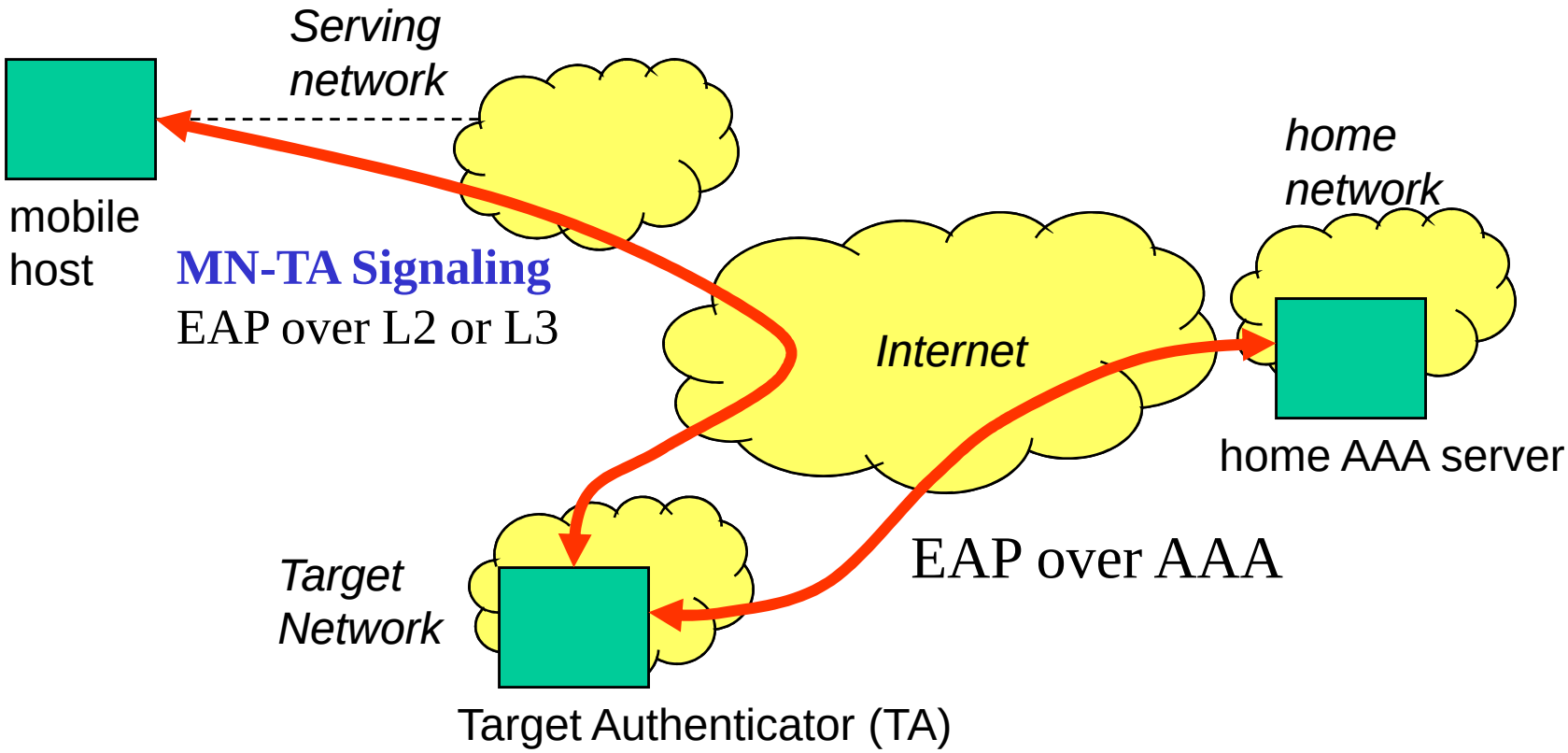
Yoshihiro Ohba
Ashutosh Dutta
Srinivas Sreemanthula
Alper Yegin
Mahalingam Mani

EAP pre-authentication

- Definition [draft-ietf-eap-keying-15]

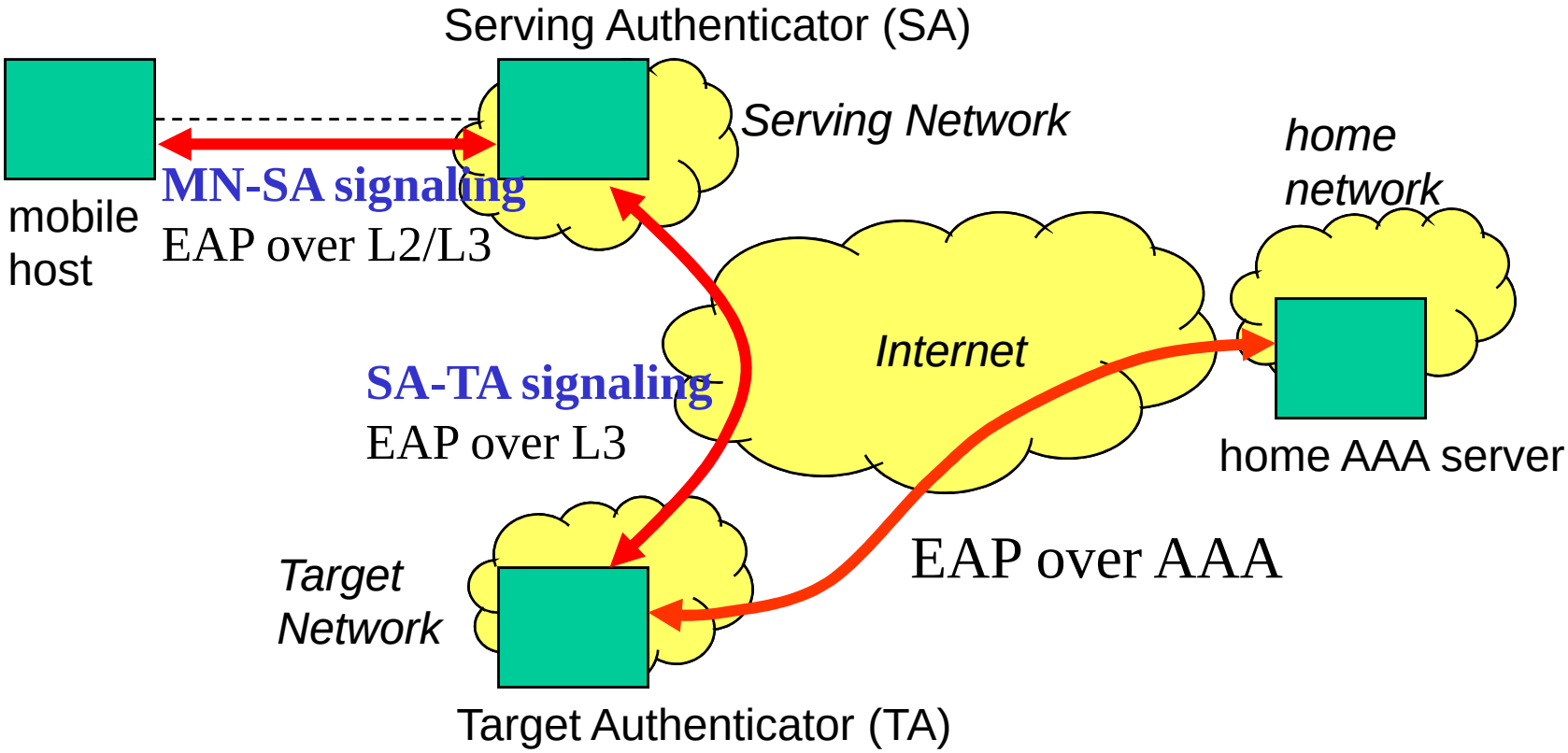
  "The use of EAP to pre-establish EAP keying material on an authenticator prior to arrival of the peer at the access network managed by that authenticator"
- Example usage of EAP pre-authentication: IEEE 802.11i pre-authentication
  - Defined for intra-ESS transitions

Scenario 1: Direct Pre-authentication



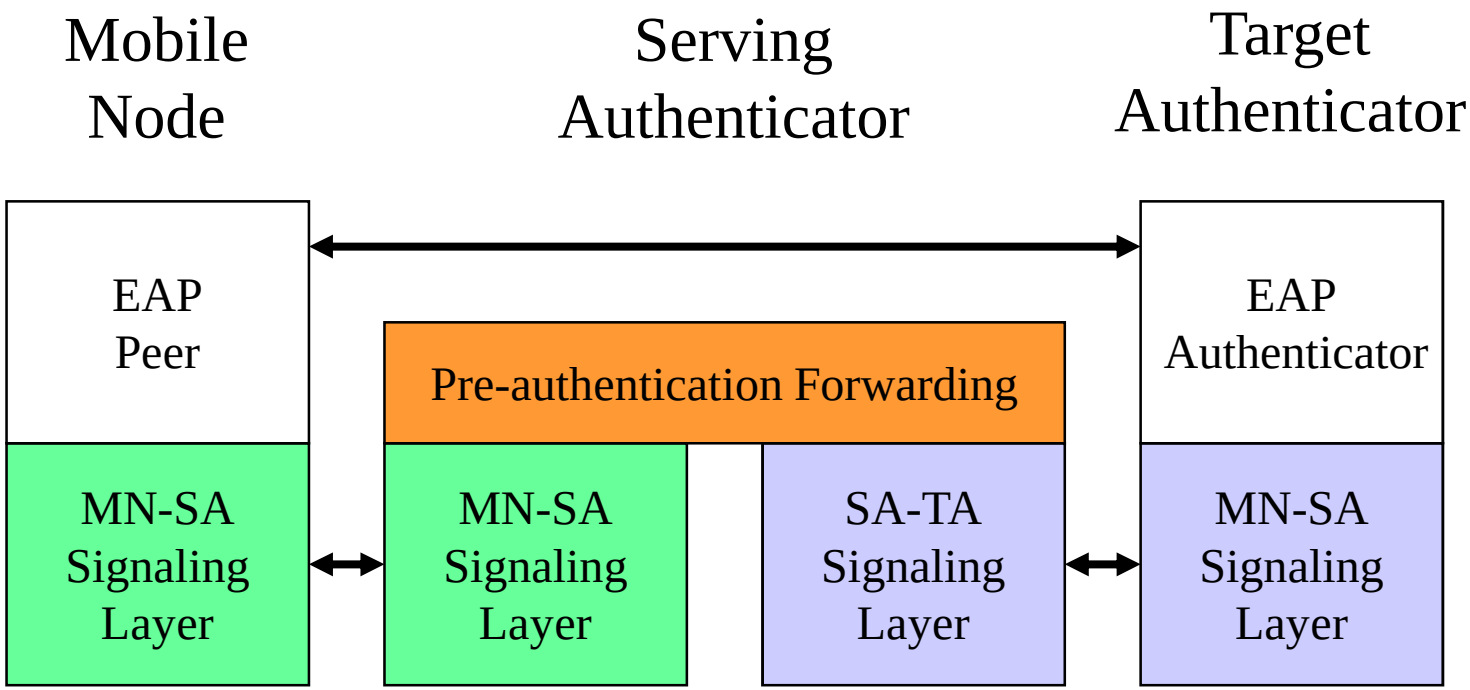
- Generate MSK with the authenticator-2 by executing EAP through it.

Scenario 2: Indirect Pre-authentication



- Generate MSK with the authenticator-2 by executing EAP through it.

Indirect Pre-authentication Layering Model



Pre-authentication AAA Requirements

- AAA requirements related to EAP pre-authentication need to be identified (See draft-nakhjiri-preauth-aaa-req-00 for details)
  - Distinguishing normal authentication from pre-authentication
  - Pre-authentication life-time
  - Re-pre-authentication
  - Post handover procedure
  - Session resumption or key caching
  - Multiple pre-authentication
  - Provisioning of serving network information
  - Network-controlled pre-authentication
- AAA requirements may affect MN-TA, MN-SA and SA-TA signaling design

HOKEY Charter in pre-authentication

- "EAP re-authentication and EAP pre-authentication authenticator are expected to use the same layer and the same protocol as the original EAP authentication used for the authenticator."

- Reason for this restriction: Inter-technology pre-authentication has technical issues that need to be studied
  - Authenticator discovery
  - Context binding

Pre-authentication issue 1: Authenticator discovery

- In general, pre-authentication requires an address of a target authenticator to be discovered either by a mobile node or by a serving authenticator prior to handover
- An authenticator discovery protocol is typically defined as a separated protocol from a pre-authentication protocol
- When a target authenticator uses link-layer EAP transport for both normal authentication and pre-authentication, target authenticator discovery is typically defined in each link-layer technology
  - E.g., 802.11k and 802.16e
- For other cases, a mechanism for discovering an IP address of target authenticator is needed
  - (IP address, link-layer address) mapping needs to be resolved

Pre-authentication issue 2: Context binding

- A mechanisms is needed to bind link-layer independent context carried over pre-authentication signaling to the link-layer specific context of the link to be established between the mobile node and the target authenticator
  - **Link-layer independent context**: the identities of peer and authenticator as well as MSK
  - **Link-layer specific context**: link-layer addresses of peer and target authenticator.

- Two possible approaches to address the context binding issue
  - **Approach 1**: communicating the lower-layer context as opaque data via pre-authentication signaling
  - **Approach 2**: use of normal EAP authentication after handover with using the same link-layer independent context for both pre-authentication and normal authentication

Pre-authentication protocol work in HOKEY WG

- Is there any protocol work needs to be done in this WG?
  - L2-agnostic pre-authentication protocol should be defined in IETF (IETF pre-authentication protocol)
    - PANA WG is defining pre-authentication extension for PANA
    - IETF pre-authentication protocol needs to be aligned with HOKEY WG charter, i.e., it should not attempt to solve **authenticator discovery with link-layer address** or **context binding**
  - L2-aware pre-authentication protocol should be defined outside IETF
    - In IEEE 802, Security Study Group is being formed in 802.21 WG
      - Pre-authentication is recognized as one study item
  - Defining new AAA attributes for pre-auth should be done in DIME and RADEXT WGs
- Pre-authentication problem statement and AAA requirements seems to be more important work in HOKEY WG

Conclusion

- Merge draft-nakhjiri-preauth-aaa-req-00 and draft-ohba-preauth-ps-01.txt into a HOKEY WG draft (intended status: Informational)

- No pre-authentication protocol needs to be defined in HOKEY WG

Back-Ups

Basic pre-auth AAA requirements

- Requirements identified in IETF65 HOAKEY BOF
  - AAA needs to know that this is a pre-authentication not normal authentication
    - User may only be allowed to have a single logon at the same time
  - AAA needs to know how long to hold the session before timing out
    - Session timeout for pre-auth may be different for normal session
    - If the mobile moves after timeout then do normal authentication
    - Addressed in draft-aboba-radext-wlan-03.txt
- Other requirements are explained in next slides

Extending pre-auth session lifetime

- Pre-authentication session lifetime may need to be extended
  - The MN may continue to stay in the serving network or move to some other network, while maintaining the pre-authentication session with a target authenticator
- Maximum pre-auth session lifetime may need to be defined in order to avoid unlimited attempts for extending pre-auth session lifetime

Reverting to pre-auth state from full authorized state

- A session with a fully authorized state may need to be changed to a pre-auth state
  - This can happen when MN moves from network N1 to network N2, and it may go back to N1 again
  - MN may not want to perform pre-authentication again with N1

Maximum number of pre-auth sessions for different authenticators

- How many pre-authentication sessions for different authenticators are allowed per MN?
- Is this a AAA protocol issue or a AAA protocol implementation issue?
  - This may be a AAA protocol issue for indirect pre-authentication in which the serving authenticator is involved in pre-auth signaling

Information on the serving network

- AAA server may need information on the serving network from which a pre-authentication attempt is being made
- This information may affect the authorization decision made by AAA server

Calling-Station-Id

- What should Calling-Station-Id be in the case of inter-technology pre-authentication?
  - Should it be the MN's address used for the serving network?
    - In this case, a Calling-Station-Id may dynamically change if MN handovers to a new nerving network and still maintains the pre-authentication state with the target network
  - Should it be the MN's address to be used for the target network?
  - Should it be null?

Network-initiated pre-authentication

- Are new AAA attributes needed to support network-initiated pre-authentication?
  - E.g., list of neighboring authenticators around the serving authenticator