



MAC-Message Authentication Code

Alice and Bob share a key  $k$

➡ HMAC - use a hash function on the message and the key

$$\text{MAC}_k(m) = H(k \parallel m)$$







$\min_{\mathbf{N}} \text{MAE}_k(\mathbf{n})$

MACKey







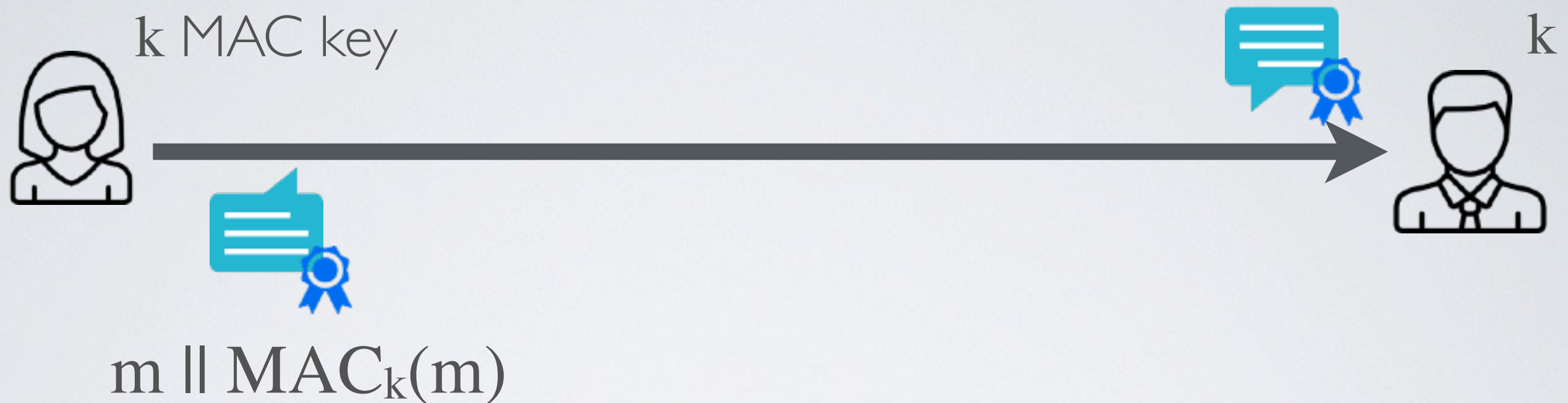








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➔ HMAC - use a hash function on the message and the key

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# Length extension attack

**Vulnerable** : MD5, SHA-1 and SHA-2 (but not SHA-3)