HMAC-authenticated Diffie-Hellman for MIKEY

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draft-ietf-msec-MIKEY-DHHMAC-00.txt

Background

- In IETF#53 (Minneapolis) comparison was made among the 3 MIKEY security protocols
  - Symmetric key distribution
  - Public-key encrypted
  - DH-SIGN

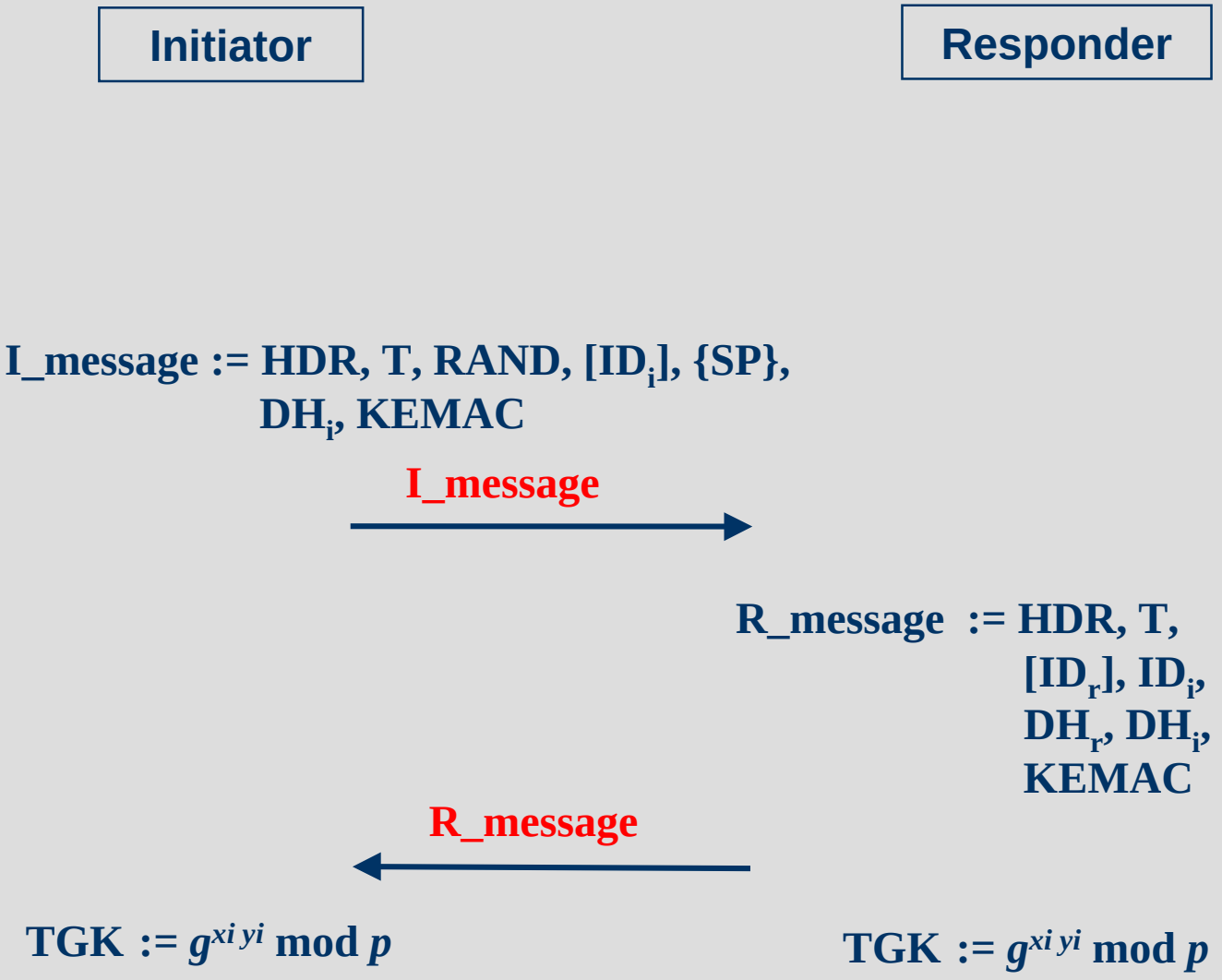
  and new proposed DH-HMAC

  w.r.t. performance, security, PKI dependency and provisioning
- Conclusions:
  - There is no single ideal solution. Each of the four key management protocols has its own merits but also drawbacks
  - None of the variants is able to subsume the other remaining variants.
  - DH-HMAC features useful security and performance properties that none of the other 3 MIKEY variants is able to provide.

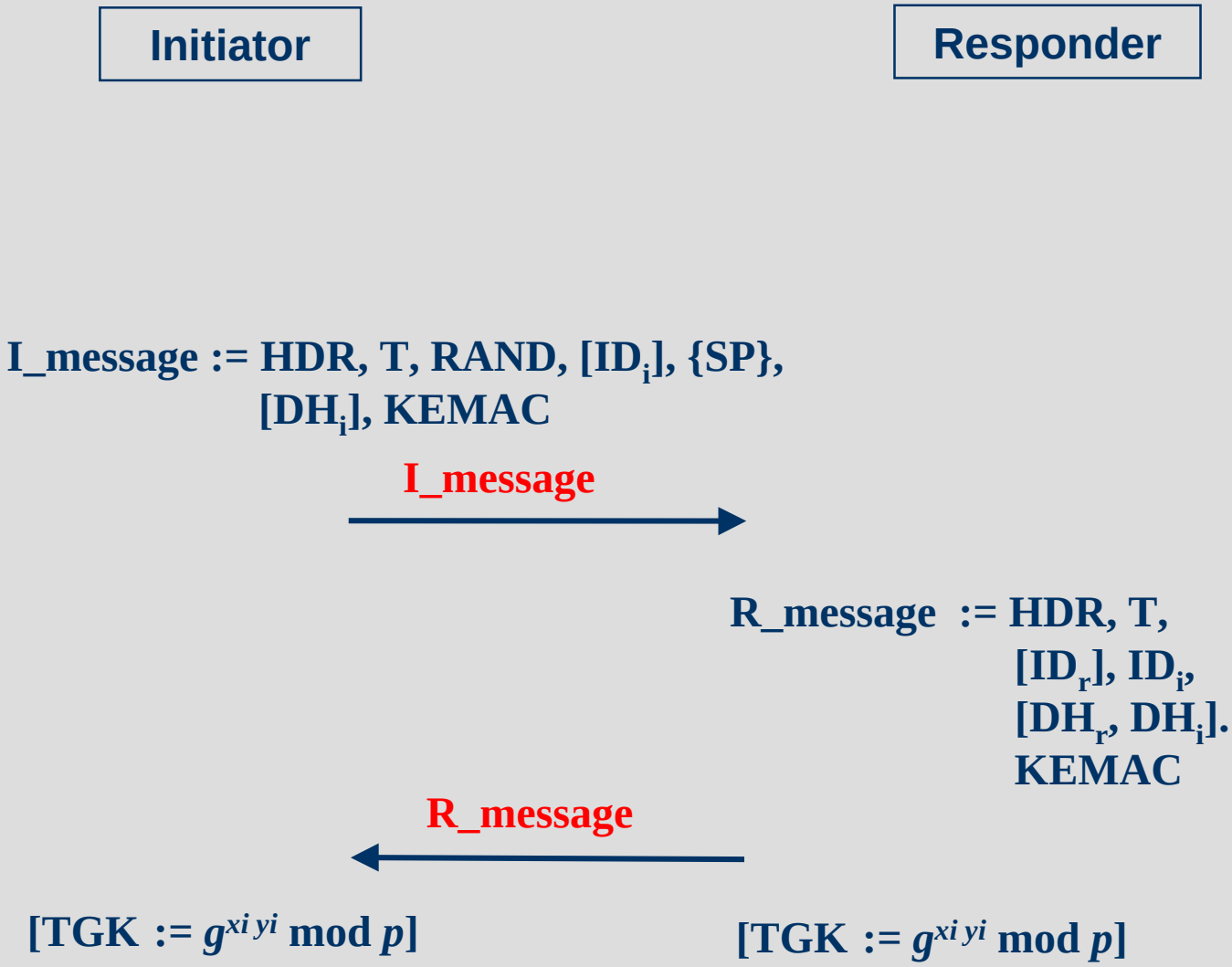
Changes against draft-euchner-MIKEY-DHHMAC-00.txt

- Made a MSEC WG draft
- Aligned with MIKEY-03 DH protocol, with notation and with payload formats
- Clarified that truncated HMAC actually truncates the HMAC result rather than the SHA1 intermediate value.
- Improved security considerations section completely rewritten
- IANA consideration section added
- A few editorial improvements and corrections
- Suggested as Informational RFC/**Proposed Standard**
- IPR clarified and IPR section changed

DH-HMAC Security Protocol



DH-HMAC TGK re-keying Security Protocol



Security Considerations Section

- Section completely rewritten in the spirit of:
  E. Rescorla, B. Korver:
  "Guidelines for Writing RFC Text on Security Considerations".

- Issues addressed:
  - Security environment
  - Threat model
  - Security features and properties
  - Assumptions
  - Residual risk

Threat model

Threats of concern:

- Unauthorized interception of plain TGKs.
- Eavesdropping of other, transmitted keying information
- Masquerade of either entity
- Man-in-the-middle attacks
- Loss of integrity

Threats not in scope:

- Passive and off-line cryptanalysis of the Diffie-Hellman algorithm
- Non-repudiation of the receipt or of the origin of the message
- Denial-of-service or distributed denial-of-service attacks.

Security features and properties

- Secure key agreement with the establishment of a TGK at both peers
- Peer-entity authentication (mutual)
- Cryptographic integrity check
- Replay protection
- Limited DoS protection
- Perfect-forward secrecy (PFS)
- Fair, mutual key contribution
- Efficiency and performance
- Security infrastructure
- NAT/Firewall-friendliness
- Scalability

Open Issues

- Enhance the MIKEY protocols by elliptic curve cryptography?
  - Provides improved performance and increased security for real-time critical applications
  - ⇨ Enhancements would not change the MIKEY security protocols
  - ⇨ but will introduce new payloads for EC-Signature (MIKEY only) and EC-DH (MIKEY and DHHMAC).
- Proposal:
  - ⇨ Define the ECC enhancements as an option to MIKEY and DHHMAC.

IPR Statement

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Thank You!
It's time for Questions...

Backup: Comparison

Symmetric key distribution:

- not scaleable to larger configurations but acceptable in small-sized groups
- no perfect forward secrecy
- key generation just by the initiator
- ✚ no dependency on a PKI
- ✚ high-performance, low bandwidth
- ✚ simple & straight-forward master key provisioning

Public-key encrypted:

- depends on PKI for full scaleability
- expensive, non-real time certificate validation
- complexity of X.509/RSA standards
- key generation just by the initiator
- no perfect forward secrecy
- ± self-signed certificates would avoid PKI ⇒ limited scaleability, complex provisioning

DH-HMAC:

- Scales just to point-to-point groups
- ✚ fair, mutual key agreement
- ✚ perfect forward secrecy
- ✚ no dependency on a PKI and PKI standards
- ✚ sound performance, reduced bandwidth
- ✚ simple & straight-forward master key provisioning

DH-SIGN:

- Scales just to point-to-point groups
- depends on PKI for full scaleability
- limited performance
- expensive, non-real time certificate validation
- complexity of X.509/RSA standards
- ± self-signed certificates would avoid PKI ⇒ limited scaleability , complex provisioning
- ✚ fair, mutual key agreement
- ✚ perfect forward secrecy