Recognized Transformations under DKIM
draft-kucherawy-dkim-transform

• First posted April 2015 during the early DMARC work
• Idea originated from some OpenDKIM debugging work (I think)
  • Could actually resolve what the breakage was
• Theory: Mailing list servers break DKIM signatures, which makes DMARC unhappy, but usually this damage is made in very small and/or well understood ways
• If that’s true, then it should be relatively easy to recover the original message and thus get the author domain signature to validate again in most cases
  • …as long as you know what the mutations were, and that they are reversible and acceptable
• Not designed to be bulletproof, only to solve the majority of use cases
• If you try this and it fails, you’re no worse off than you were without even trying
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- So record the *reversible* transformations that commonly occur, and decide what you consider to be *acceptable*
  - Probably the order matters, but maybe not if they don’t overlap
- Reached out to Mailman, Sympa, and L-Soft; only Mailman replied
  - Got a comprehensive list of message mutations they make
  - Developed a first list of common, *reversible* transformations, and descriptions for these
  - Proposed a DKIM tag that contains the list of transformations the verifier should apply to try to recover the original message
- Declared an IANA registry for known transformations
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- Assume an original message (O) bearing an author domain signature (A) arrives via a Mailing List Manager; the arriving message (M) now also has a list domain signature (L)
- L verifies but A does not, as you’d expect
- But L has a tag on it claiming the MLM made transformations T1, T2, and T3
  - So M = T3(T2(T1(O)))
- These transformations are well understood and reversible
  - Then in theory, T1’(T2’(T3’(M))) = O
- Now you can verify A against O and, if you concur that T1, T2, and T3 were acceptable, you can treat M the same as O in terms of trust
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• Upsides:
  • No crypto, no need for DNS; lightweight and simple when compared to ARC
  • The first set of proposed transformations are well understood

• Considerations:
  • The MIME transformations seem easy to describe, especially when manipulated as objects, but whitespace mush might make precision difficult
  • An attacker can take a legitimate message and subject it to these mutations, adding spam to the body or header, and claim to be an MLM
    • Harkens back to the old “l=“ tag problem
    • This is why I mentioned that the transformation also has to be acceptable