# TEEP Protocol

draft-ietf-teep-protocol-05

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# Changes since IETF 109 (1/2)

- Resolutions from IETF 109 TEEP meeting:
  - Combined Install/Delete into Update message
  - Made token be absent when redundant, e.g., with attestation
  - Both ciphersuites are MTI on TAM and optional on Agent
  - Use SUIT Component Identifier as Trusted Component id
- Resolutions based on IETF 109 SUIT meeting:
  - SUIT manifest is now used to delete components

# Changes since IETF 109 (2/2)

1. Added reference to relevant EAT claims - **see later slide**
2. Added sample EAT - **see later slide**
3. Updated error codes – **see later slide**
4. Added max sizes to various fields
5. Added behavior specification
6. Various editorial clarifications

# #49: EAT Claims meeting TEEP Arch req'ts

| Arch draft requirement | Claim | Reference |
|---|---|---|
| Device unique identifier | device-identifier | draft-birkholz-rats-suit-claims, § 3.1.3 |
| Device vendor | vendor-identifier | draft-birkholz-rats-suit-claims, § 3.1.1 |
| Device class | class-identifier | draft-birkholz-rats-suit-claims, § 3.1.2 |
| TEE hardware type | chip-version-scheme | draft-ietf-rats-eat, § 3.7 |
| TEE hardware version | chip-version-scheme | draft-ietf-rats-eat, § 3.7 |
| TEE firmware type | component-identifier | draft-birkholz-rats-suit-claims, § 3.1.4 |
| TEE firmware version | version | draft-birkholz-rats-suit-claims, § 3.1.8 |
| Freshness proof | nonce | draft-ietf-rats-eat, § 3.3 |

- All requirements appear to be met between the above two drafts
- One is not a RATS WG doc (yet?) but TEEP has a normative dependency

# #67: Sample EAT (not yet implementable)

```
{
    / issuer /                    1: "joe",
    / timestamp (iat) /           6: 1(1526542894)
    / nonce /                    10: h'948f8860d13a463e8e',
    / secure-boot /              15: true,
    / debug-status /             16: 3, / disabled-permanently /
    / security-level /         <TBD>: 3, / secure-restricted /
    / device-identifier /      <TBD>: h'e99600dd921649798b013e9752dcf0c5',
    / vendor-identifier /      <TBD>: h'2b03879b33434a7ca682b8af84c19fd4',
    / class-identifier /       <TBD>: h'9714a5796bd245a3a4ab4f977cb8487f',
    / chip-version-scheme /  <TBD35>: "MyTEE v1.0",
    / component-identifier /   <TBD>: h'60822887d35e43d5b603d18bcaa3f08d',
    / version /                <TBD>: "v0.1"
}
```

# OPEN #51: Error codes (1/2)

- Error messages have an integer error code and an optional text message
  - Draft -04 had lots of error codes and an IANA registry
- Draft -05 proposes:
  - New error codes should be added sparingly, not for every implementation error.
  - That is the intent of the err-msg field, which can be used to provide details meaningful to humans.
  - New error codes should **only be added if the TAM is expected to do something behaviorally different** upon receipt of the error message, rather than just logging the event.
  - Hence, each error code is responsible for saying what the behavioral difference is expected to be.
- Since error code implies protocol behavior difference, and protocol behavior is protocol specification, removed IANA registry
- Also reduced number of error codes, and added *example* behavioral differences

# OPEN #51: Error codes (2/2)

A TAM receiving this error might…

- **ERR_PERMANENT_ERROR:** stop trying for some (long) time
- **ERR_UNSUPPORTED_EXTENSION:** retry without using extensions
- **ERR_UNSUPPORTED_MSG_VERSION:** retry using different version
- **ERR_UNSUPPORTED_CRYPTO_ALG:** retry using different crypto alg
- **ERR_BAD_CERTIFICATE:** attempt to use an alternate certificate
- **ERR_CERTIFICATE_EXPIRED:** renew its certificate before using it again
- **ERR_TEMPORARY_ERROR:** retry after some (short) time
- **ERR_MANIFEST_PROCESSING_FAILED:** attempt to install or update other components that do not depend on the failed manifest

# OPEN #129: errors processing QueryRequest

- Spec defines errors for things that could be hit by QueryRequest:
  - ERR_UNSUPPORTED_MSG_VERSION, ERR_UNSUPPORTED_CRYPTO_ALG, …-
- But specifies Error message can only be sent in response to Update
- Options:
  1. Allow Error to be sent in response to QueryRequest
  2. Silently drop QueryRequest (but harder to debug)
  3. Duplicate optional error fields into QueryRequest message

- PROPOSED RESOLUTION: option 1

# #132: Ciphersuites (Russ's review)

| Value | Ciphersuite |
|---|---|
| 1 | AES-CCM-16-64-128, HMAC 256/256, X25519, EdDSA |
| 2 | AES-CCM-16-64-128, HMAC 256/256, P-256, ES256 |

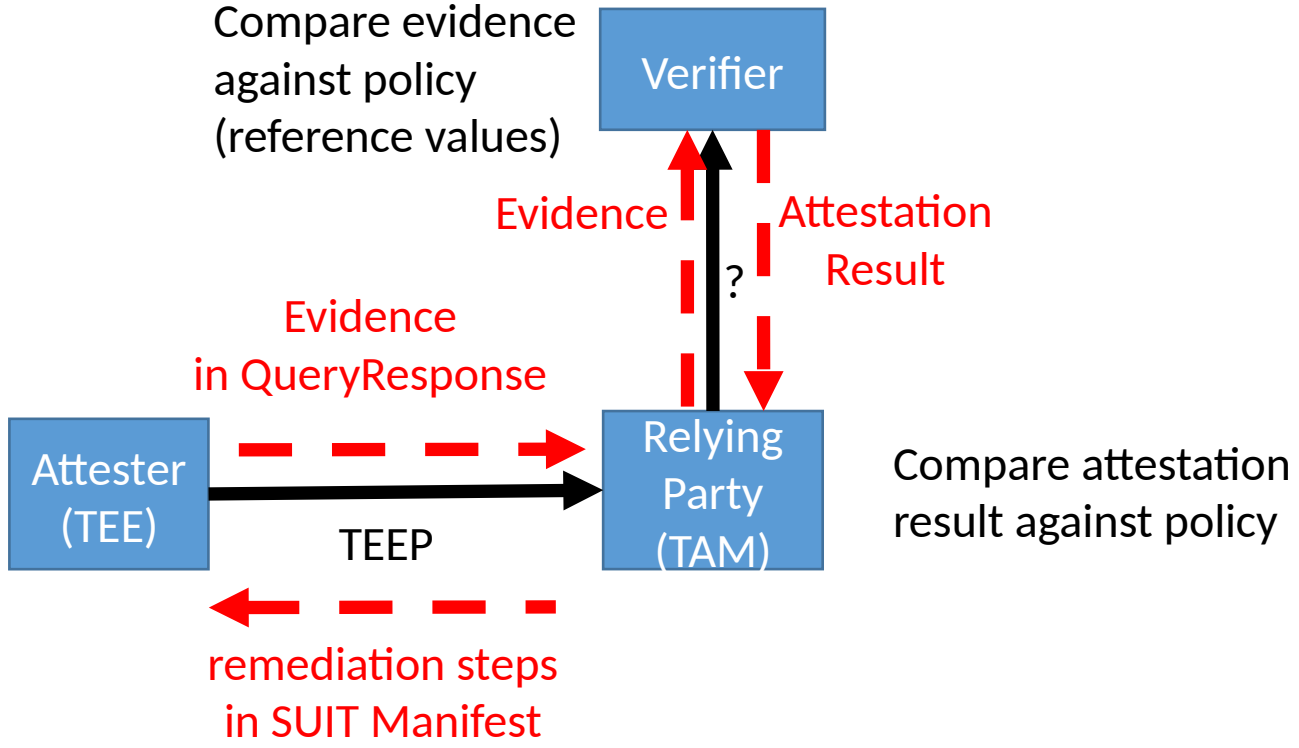
- Russ: I think that future ciphersuites should allow MAC algorithms other than HMAC, such as GMAC. Just change "HMAC" to "MAC"
- In Section 9, please say whether future registrations will allow integrity-without-confidentiality ciphersuites. Let's settle this now instead of dumping on the IANA Expert.

# OPEN #41: SUIT manifest example(s)

- Add to TEEP Protocol spec or SUIT manifest spec?
  - SUIT manifest spec has 6 other examples in appendix B,
    - but is close to done and SUIT Reports are in a different spec
  - Propose putting in TEEP protocol spec with both manifest and report
- Possible examples:
  - Manifest: Install a TA that needs personalization data from another TAM
  - Report: partial success (e.g., failure of personalization data)
  - Manifest: Remove a TA and its dependency (e.g., personalization data)
  - Report: full success

# Use of Tokens in TEEP:
## Freshness and State Matching

# First some recap of RATS relationship…



# Freshness & replay protection in RATS

- Verifier cares about:
  - Was Evidence recently signed by Attester, not an old replay?
  - Are values of claims recent, not obsolete values in recent evidence?
- Relying Party (TAM) cares about:
  - Was Attestation Result is recently signed by Verifier, not an old replay?
  - Are values of any claims recent, not obsolete values in recent results?
- How “recent” is up to the appraisal policy
- Details are up to the protocol, but there are three common ways…

# Method 1: Timestamps

- Put timestamps in claims in Evidence and Attestation Results
- Requires roughly synchronized clocks
  - Requires a trusted source of time, internal or external
  - Requires secure time sync protocol (e.g., ntpsec inside TEE)
- Also adds claims about the signer’s time sync mechanism
- No additional messages or state at attestation time

# Method 2: Nonces

- Receiver supplies nonce that sender must include in signed Evidence or Attestation Results
- No dependency on time sync or clocks at senders
- Receivers have to keep state to remember each nonce supplied until it’s used
- Receivers need a clock to “expire” nonces, but need not be synced
- Only addresses freshness of Evidence / Attestation Results, not freshness of claim values

# Method 3: Epoch handles

- Some “handle distributor” periodically sends out epoch handles to sender(s) and receiver(s)
- Senders use latest epoch handle in all messages in place of nonce
- Receivers check if received handle is in most recent set (e.g., of size 2)
- Receiver state is constant, compared to nonces
- Only handle distributor requires a reliable clock
- “Recency” policy limited to a multiple of handle distribution period

# OPEN #131: Challenge when attestation bit set

- QueryResponse has opt. “challenge” field used in creating Evidence:
  - “When a challenge is provided in the QueryRequest and an EAT is returned with the QueryResponse message then the challenge contained in this request MUST be copied into the **nonce** claim found in the EAT.”
- Q1: does TEEP require nonce approach or is any of the approaches ok?
  - Original intent: any is ok, attestation bit can be set with challenge absent
- Q2: But then how do Verifier & Agent agree on freshness approach?
  - Evidence carries approach specific claim (EAT: nonce, timestamp, *handle*?)
- Option 1: force use of a single approach (narrows TEEP applicability)
- Option 2: force Agent to support all (hard for constrained Agents)
- **Option 3:** add field in QueryRequest like we did for supported ciphersuites
  - but TAM is just a passthrough, like for challenge
- Option 4: overload challenge field and make it mandatory when attestation bit set

# OPEN #127: Use of token vs challenge in QueryRequest

```
query-request = [ …
    ? token => bstr .size (8..64),
    ? challenge => bstr .size (8..64),
```

…

The token is not needed when the attestation bit is set in the data-item-requested value. The size of the token is at least 8 bytes (64 bits) and maximum of 64 bytes, which is the same as in an EAT Nonce Claim

- Intent was:
  - token is present iff attestation bit is clear (used in response token)
  - challenge is only allowed if attestation bit is set (used in evidence)
- Currently have separate CBOR label values
- QUESTION: Should we combine them into one label?

# OPEN #40: unsolicited QueryResponse?

- If Attestation is used with timestamps or handles, then no need for per-request token or nonce
- Do we still need extra round trip to get QueryRequest?
- Proposed optimization:
  - If a QueryRequest is received that contains no token or challenge, Agent MAY cache the QueryRequest and send unsolicited QueryResponses to that TAM URI when handling a RequestTA or UnrequestTA API call
  - Handling a RequestPolicyCheck API call shall always generate a QueryRequest, to enable detecting changes at TAM
- Also avoids bad Agent incentive to have frequent RequestPolicyCheck just to get QueryRequests you can pend for when you need them

# OPEN #83: How long should TAM keep token?

- #43 was discussed at IETF 109 with resolution:
  - Agent's SUIT processor resolves dependencies, and doesn't respond to initial Install *until all dependencies are resolved and SUIT processing completes*
  - This also affects state requirement around tokens (and nonces!)
- Some discussion in PR #110
  - Akira & Ming proposed one-day timeout as strawman
    - This seems too long to me, since freshness and state minimization both motivate as small as possible; prefer O(minutes) but admin configurable
  - Ming mentions "dormant" device case must be handled
    - But device gets token when awake since transport (today) is Agent-initiated
  - Ming proposed allowing TAM to be stateless by carrying TAM's expiration time in field that is echo'ed back to the TAM
    - Token would need to be TAM-signed "cookie" so Agent can't simply change it
      - Would need changes to description of token field since not just "random"