BPSec Updates
Interop Security Context
Security Context Template

IETF-108

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Bpsec Current Status

- Summary
  - https://datatracker.ietf.org/doc/draft-ietf-dtn-bpsec/ballot/
  - Genart – Editorial comments, all resolved
  - IANA – No issues.

- Yes
  - M. Westerlund
- No objection
  - D. Brungard, A. Cooper, R. Danyliw, B. Leiba, A. Retana, E. Vyncke
  - Comments from above addressed in -22.
- Discuss
  - M. Kuhlewind
  - B. Kaduk
  - Most items believed addressed in -22. Waiting for confirmation.

BPSec Open Question #1

- Should there be one security context that is considered “Mandatory to Implement” (MTI) for all BPSec implementations?
  - BPSec-22 does not mandate a security context.
  - States that a network/deployment must mandate a security context.
  - Provides a default to be used if not other context is mandated. (Section 9.1)

    Implementations of BPSec MUST support the mandated security contexts of the networks in which they are applied. If no set of security contexts is mandated for a given network, then the BPSec implementation MUST, at a minimum, implement the security context defined in [I-D.ietf-dtn-bpsec-interop-sc]. If a node serves as a gateway amongst two or more networks, the BPSec implementation at that node MUST support the union of security contexts mandated in those networks.

  - Pre
  - Does not force one network to support a context it will never use.

Recommend no change – but ADs may feel strongly.

BPSec Open Question #2

- Can BPSec be standardized absent a key exchange protocol?
  - BPSec-22 does not mandate a key exchange protocol
    - *Different security contexts will use different key exchange protocol*
    - *Some will be pre-placed symmetric (KeK or other)*
    - *Some will be IKE*
    - *Some may be DTKA.*
  - Key Management is not part of the normative BPSec Spec (Section 6)

There exist a myriad of ways to establish, communicate, and otherwise manage key information in a DTN. Certain DTN deployments might follow established protocols for key management whereas other DTN deployments might require new and novel approaches. BPSec assumes that key management is handled as a separate part of network management and this specification neither defines nor requires a specific key management strategy.

Recommend no change.

BPSec Open Question #3

- Consider allowing nested signatures
  - BPSec-22 does not allow multiple signatures on same target
    - *Proposed change: Allow multiple nodes to sign blocks*
      - Nodes 1,2,3 independently sign a target block. (BIB1, BIB2, BIB3)
    - *Security acceptors determine which BIB to pay attention to*
      - Acceptor 1 may only pay attention to Node 1 signatures.
      - Acceptor 2 may only pay attention to Node 2 signatures, and so on.
    - *Thoughts*
      - Pushes complexity into node policy configuration.
      - Why trust integrity from a non-block source? If not signed from source, it may have changed.
      - Is “intermediate” integrity a significant need?
      - Can get this with other mechanisms: new security block type or encapsulation.

Recommend no change.

BPSec Open Question #4

- Consider signature or encryption over multiple blocks.
  - BPSec-22 does not allow calculating a single signature over > 1 target block
    - *Example: calculate a single signature over primary block and payload block*
  - Thoughts
    - *BPSec BIB and BCB are meant to be “single-target” services*
      - May generate multiple security results for a single target (based on context)
      - But always a 1-many relationship: target to results.
    - *A multi-target service may be useful, but not part of baseline BPSec*
      - BPSec provides guidelines for other security blocks (Section 10)
      - A multi-target block (many-to-many) should be defined in a different document (and only if needed).
    - *Proposed clarifying text change:*
      - Note that BIB and BCB provides “single-target integrity” and “single-target confidentiality”

Recommend clarifying text change to BPSec-22.

BPSec Open Question #5

- Bundle Protocol Reason Codes
  - A BP Node may discard a bundle for security reasons.
  - Should BPSec define BP reason codes for admin records reflecting this?
    - *Reason Codes:*
      - **Missing Security Service**: Required service not present in bundle at waypoint or acceptor.
      - **Unknown Security Service**: Unknown context, parameter, etc… at waypoint/acceptor.
      - **Unexpected Security Service**: More security in bundle than expected.
      - **Failed Security Service**: Failed to verify integrity or decrypt a services at waypoint or acceptor.
      - **Conflicting Security Service**: security blocks violate BPSec rules.
  - Thoughts
    - *We can place them in BPSec, or in another document*
    - *Ex: Security Context Template.*
      - https://tools.ietf.org/html/draft-birrane-dtn-scot-00#section-2.3.1

No recommendation

BPSec Open Question #6

- Should BPSec encode security context parms as a CBOR Map
  - There may be efficiencies using Map instead of Array

> Security Context Parameters (Optional):
[B. Kaduk] Why do we use an array of (index, value) tuples instead of a CBOR map?

[E. Birrane] There was no strong preference for encoding representation. Does a CBOR map result in a smaller size?

[B. Kaduk] I am not 100% sure but I think there would be some encoding efficiency from not needing repeated array framing. (Maps also help when you can assign short integer map keys to attributes that otherwise would have longer, e.g., string, names, but the Ids here are already integers so that's a > no-op.)

[E. Birrane] Recommend no change here.

Recommend no change.

BPSec Open Question #7

- Should BPSec force integrity of non-block-type-specific data?
  - Protect integrity of security context parms, etc…
  - Associate security block with primary block.
    - *Carry signature of primary block in each security block*
  - Thoughts
    - *Security results MUST include some protection of the important parts of the security block.*
      - How this is done is a matter of the **security contexts themselves** and should not be mandated in the BPSec itself.
    - *Multiple ways to protect this information.*
      - One approach: sign this information and carry the signature.
      - Another approach: sign each parameter (nodes can recover use defaults for corrupt parms)
      - Convey parameters as a single BLOB in the block exchanged between nodes.

Add non-normative text to “Security Context Considerations”

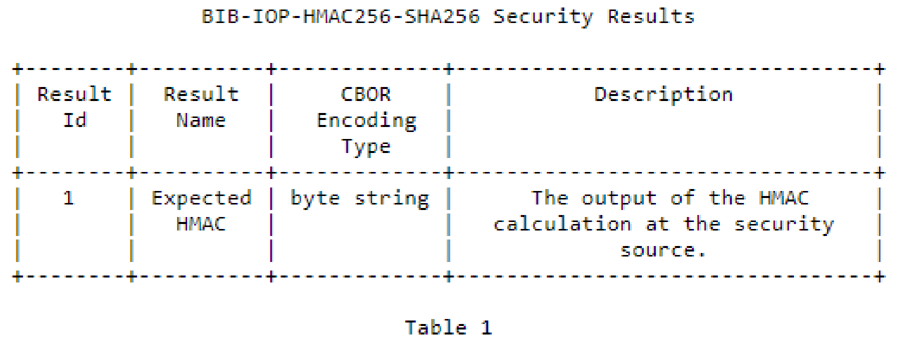
BPSec Open Question #8

- Should BPSec reserve some security context parm/result ids to promote commonality?
  - Create 2 registries: Security Context Parameter IDs, Security Context Result IDs
    - *Specify 0-15 as “reserved” for each.*
    - *Specify > 16 as “defined in relevant security context document”.*
    - *IDs 0-15 would be shared across all security contexts.*
    - *IDs > 16 would be different for different security contexts.*
  - Thoughts
    - *May help develop commonality in security context specifications.*
    - *Reduce duplication of same values across multiple security contexts*
    - *Reduce confusion:*
      - Initialization Vector is ID #1 in security context 1, but ID #17 in security context 2?

Recommend BPSec define SC Parm/Result with reserved IDs.

BPSec Interop Security Context

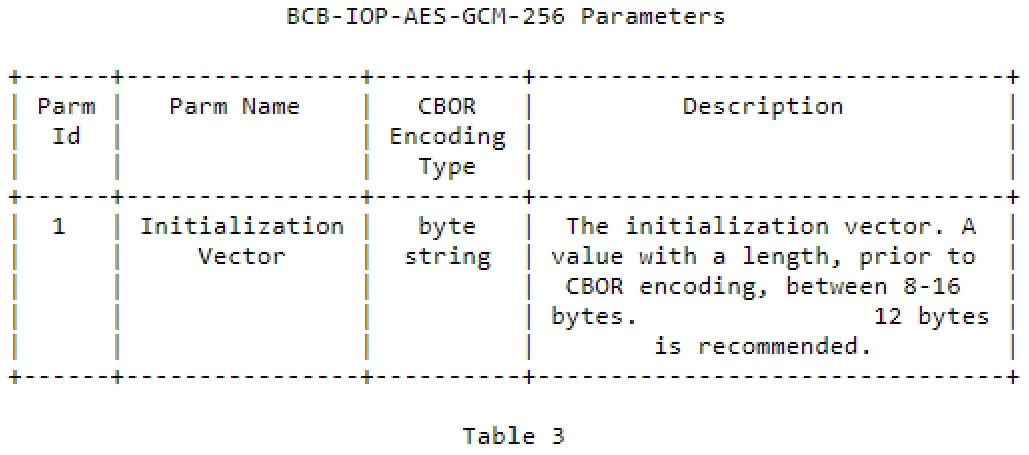
- No identified changes to this
  - https://tools.ietf.org/html/draft-ietf-dtn-bpsec-interop-sc-01
  - BIB-IOP-HMAC256-SHA256



BIB-IOP-HMAC256-SHA256 Security Results

Result Id	Result Name	CBOR Encoding Type	Description
1	Expected HMAC	byte string	The output of the HMAC calculation at the security source.

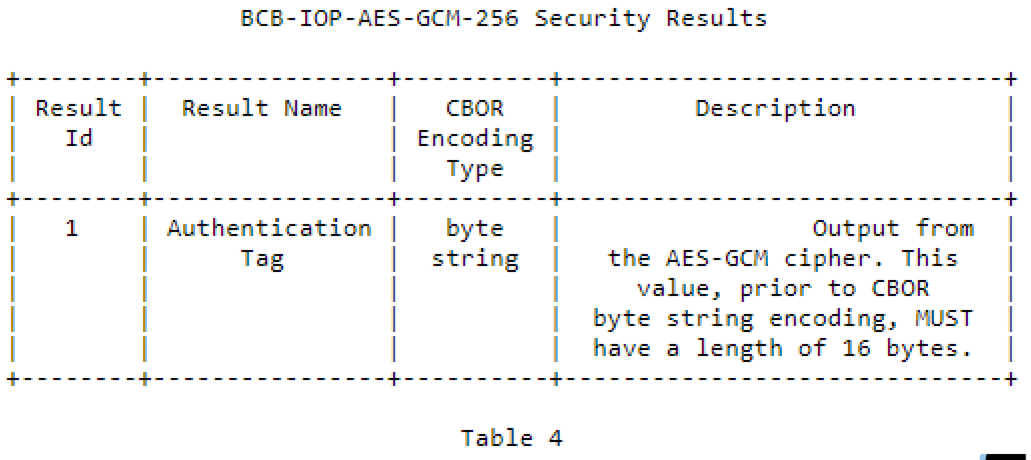
Table 1



BCB-IOP-AES-GCM-256 Parameters

Parm Id	Parm Name	CBOR Encoding Type	Description
1	Initialization Vector	byte string	The initialization vector. A value with a length, prior to CBOR encoding, between 8-16 bytes. 12 bytes is recommended.

Table 3



BCB-IOP-AES-GCM-256 Security Results

Result Id	Result Name	CBOR Encoding Type	Description
1	Authentication Tag	byte string	Output from the AES-GCM cipher. This value, prior to CBOR byte string encoding, MUST have a length of 16 bytes.

Table 4

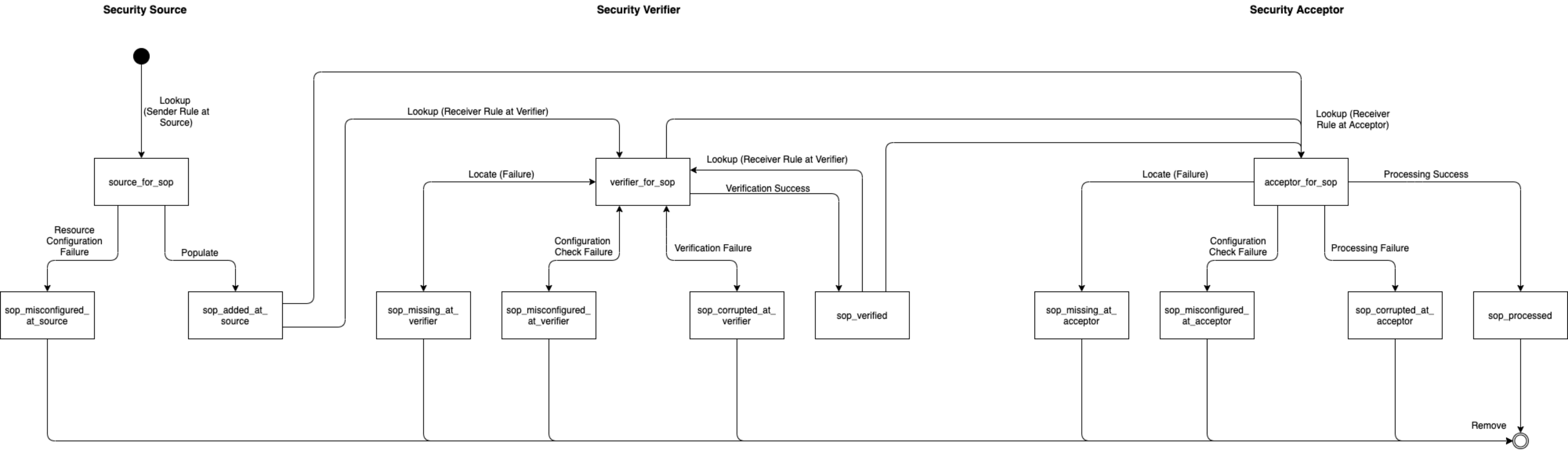
Security Context Template (SCoT)

- Recall what a security context is
  - Cipher suite(s)
  - Configuration
  - Usage
- Guidelines for writing security contex
  - Policy considerations
  - Canonicalization considerations
  - Usage, configuration, error handling
- Define common standards/enums
  - Common parameters
  - Common result types
  - Common reason codes (BPv7)

Great value in non-normative guidance. To include suggested “table of contents” for security contexts, and critical information. Expansion of the “security context considerations” from BPSec.

Normative information relating to enumerations, states, etc… to build compatible contexts.

BPSec Policy: Lifecycle of a Security Operation



Security Source

Security Verifier

Security Acceptor

Lookup (Sender Rule at Source)

source_for_sop

Resource Configuration Failure

Populate

sop_misconfigured_at_source

sop_added_at_source

Lookup (Receiver Rule at Verifier)

Locate (Failure)

verifier_for_sop

Lookup (Receiver Rule at Verifier)

Verification Success

Configuration Check Failure

Verification Failure

sop_missing_at_verifier

sop_misconfigured_at_verifier

sop_corrupted_at_verifier

sop_verified

Lookup (Receiver Rule at Acceptor)

Locate (Failure)

acceptor_for_sop

Processing Success

Configuration Check Failure

Processing Failure

sop_missing_at_acceptor

sop_misconfigured_at_acceptor

sop_corrupted_at_acceptor

sop_processed

Remove

BPSec Policy: Events, Actions, Reasons

	Event Mnemonic	Remove Sop	Remove Sop's Tgt and Associated Sops	Do Not Forward Bundle	Request Bundle Storage	Report with this Reason Code (8-bit	Remove All Sops for tgt.	Mask of BPCF to process as if tgt block could not have been processed.	Mask of BPCF for security block: Used to set the BPCF when the security block is created, or indicate the need to process the security block's current BPCF.
1. Lookup (Security Source)	sop_needed								
2. Populate	sop_added					X			X - Used to set the BPCF of the security block
3. Configure Resource (Failure)	sop_misconfigured	X	X	X	X	X	X		
4. Lookup (Security Verifier)	sop_needed								
5. Configure Resource (Failure)	sop_misconfigured	X	X	X	X	X		X	X - Follow the security block BPCF
6. Locate (Failure)	sop_missing		X	X	X	X		X	X - Follow the security block BPCF
7. Check Configuration (Failure)	sop_misconfigured	X	X	X	X	X		X	X - Follow the security block BPCF
8. Verify (Success)	sop_processed					X			
9. Policy Decision (Verification Failure)	sop_corrupted	X	X	X	X	X	X	X	X - Follow the security block BPCF
10. Lookup (Security Acceptor)	sop_needed								
11. Locate (Failure)	sop_missing		X	X	X	X		X	X - Follow the security block BPCF
12. Configure Resource (Failure)	sop_misconfigured		X	X	X	X		X	X - Follow the security block BPCF
13. Check Configuration (Failure)	sop_misconfigured		X	X	X	X		X	X - Follow the security block BPCF
14. Accept (Failure)	sop_corrupted		X	X	X	X	X	X	X - Follow the security block BPCF

- Security Reason Codes
  - Missing
  - Unknown
  - Unexpected
  - Failed
  - Conflicting

14 notable events in the lifecycle of a security operation

Small set of actions that can be codified per event.

Also override some security and target processing flags.

BP Status Report Reason Codes