BPSec Updates

IETF-106

Edward Birrane
Edward.Birrane@jhuapl.edu
443-778-7423

APL
JOHNS HOPKINS UNIVERSITY
Applied Physics Laboratory

Overview

- BPSec v12 Review Comments
- BPSec v13 Updates
- Remaining BPSec Activities
- Interoperability Cipher Suites
  - Single-Target, Multi-Result
- Security Context Policy Rules

bpsec-12 reviews

1. GenArt
    - Ready with nits
    - Under section 1.4, BPA is referenced in bullet 1 and 2 but is first defined in bullet 4. Suggest defining that in bullet 1.
    - "never used to sign the cipher- text provided" has an extra space between cipher- and text.
    - "The BCB is decrypted by security- aware nodes in the" has an extra space between security- and aware.

- Sec-AD
    - Pending

bpsec-12 reviews

1. IANA
   - Converged on the registry questions in the new Bundle Protocol specification, agreeing to register new BPv7 block type numbers in the existing Bundle Block Types registry rather than starting up a new registry for BPv7 block types.
   - Block type numbers 2 and 3 -- originally requested for the BPsec BIB and BCB blocks -- are not available (they are used by the old Bundle Authentication Block and Payload Integrity Block), so we must assign from one of the unassigned ranges.
   - The BPbis specification requests that block types 11 and 12 be reserved for the Block Integrity Block and Block Confidentiality Block respectively, so those are the values that I would propose we assign.
   - A slightly revised BPsec Internet Draft will be posted that simply requests that IANA assign numbers for these two blocks, without specifically asking for any particular values, so in the end I think there will be no conflict.

bpsec-13 updates

1. Minor changes
   - No technical change to the standard, data structures, or processing.
2. Corrected Gen-Art nits.
3. Clean up some terminology
   - Bpsec-12 had some remaining references directly to key parameters instead of the more general security context parameters.
   - Ensured consistent use of security context terminology versus cipher suite terminology.
   - Fixed description error in the BPSec example.
   - Changed BIB and BCB block types to 11 and 12
     - *May need to change to “IANA assigned” and not hard-code to 11/12*

Remaining bpsec activities?

- Waiting for security ad reviews
  - Initial review from bpsec-06. Comments from that review have been incorporated.
- Updated IANA section
  - Final edit to ensure that the IANA section is correct regarding block types.
- Terminology updates
  - The use of term “EID-reference” should be updated to just say “EID” to avoid confusion with the BPv6 concept of bundle dictionaries and EID references into dictionaries.
- Any other review comments.

Variety of security context concepts

- Self-signing BIB
  - Store an integrity signature on the target block.
  - Store an integrity signature on the BIB itself (parameters, targets)

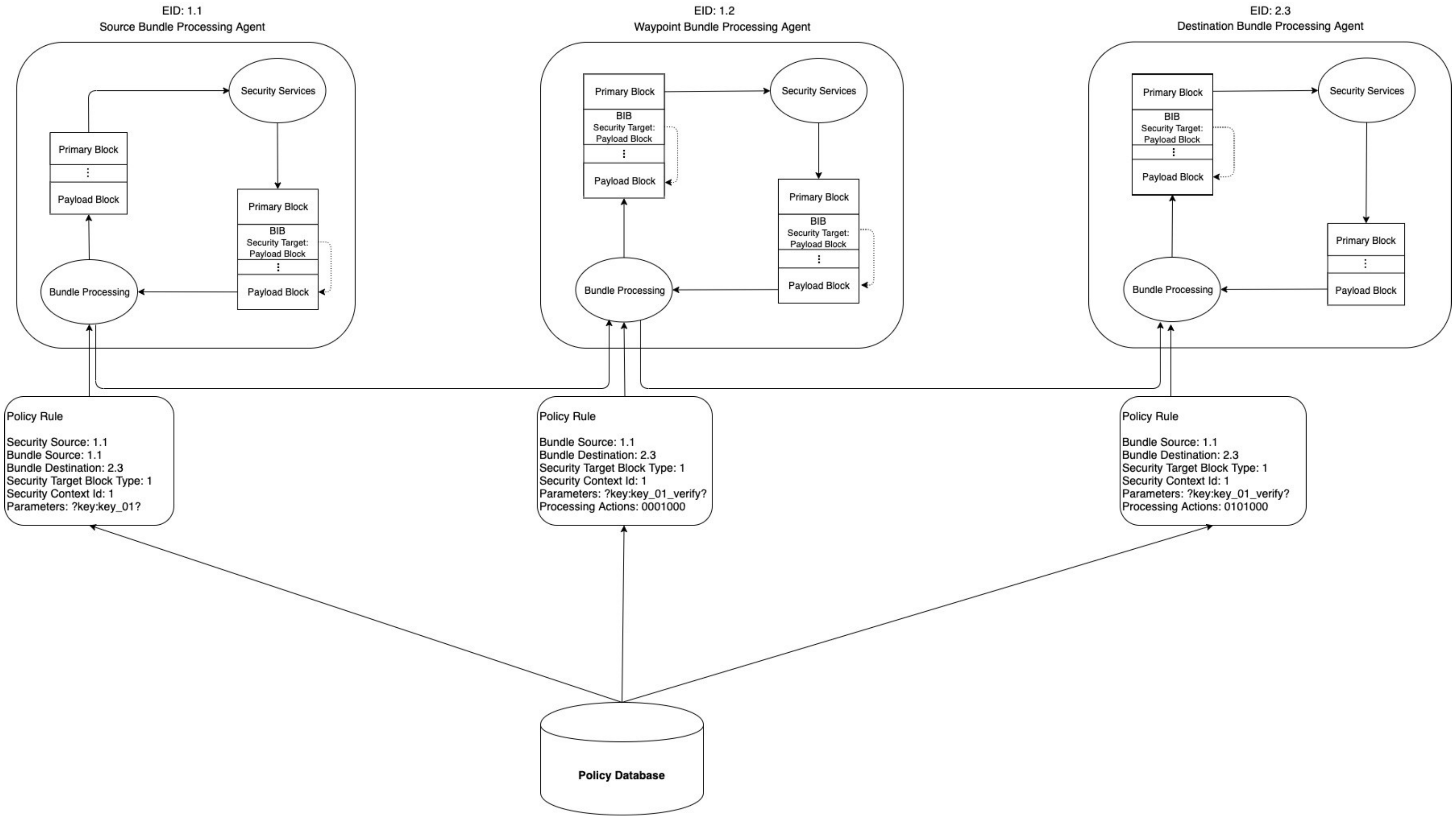
- Single-Target, Multi-Result BIB
  - Hold multiple security results per target.
  - Security context defines potential for multiple key parameters

- Questions for interoperability security context
  - BIB: Should the signature be calculated over the entire target block (including extension block header) or simply over the block type-specific data fields?
  - BCB: Should BCB calculate separate plain-text signature over extension block header?

Security context policy rules

- What are policy rules?
  - Out-of-band configurations for how to apply/process security blocks.
  - Must be separate from information in a bundle.
    - *Bundle contents can be manipulated by a malicious actor, so bundles must not solely encode security policy.*
    - *Example: An actor removes a BIB, then changes a BIB target. A receiver must know that a BIB is required to detect this malicious change.*
- Roles and Responsibilities
  - Security Source
    - *Responsible for determining which security services should be added to a bundle.*
    - *May or may not be the bundle destination.*
  - Security Waypoint
    - *Responsible for (optionally) verifying security services.*
  - Security Destination
    - *Responsibly for processing and removing security services.*
    - *May or may not be the bundle destination.*

Bpsec policy roles



Policy Rule

Security Source: 1.1
Bundle Source: 1.1
Bundle Destination: 2.3
Security Target Block Type: 1
Security Context Id: 1
Parameters: ?key:key_01?

Policy Rule

Bundle Source: 1.1
Bundle Destination: 2.3
Security Target Block Type: 1
Security Context Id: 1
Parameters: ?key:key_01_verify?
Processing Actions: 0001000

Policy Rule

Bundle Source: 1.1
Bundle Destination: 2.3
Security Target Block Type: 1
Security Context Id: 1
Parameters: ?key:key_01_verify?
Processing Actions: 0101000

Security Source Rules

- What is a source rule?
  - A definition which can be matched against a bundle
  - If block matches some criteria, then apply given security service.
- Requires 6 pieces of information
  1. Bundle Source (EID)
  2. Bundle Destination (EID)
  3. Target Block Type

  Block identification information

  4. Security Source (EID)
  5. Security Context ID
  6. Security Parameters

  Required security service Information

- Example
  - {“ipn1.*”, “*”, 1, “ipn1.0”, 7, “keyname=1”}
  - Any payload block originating from IPN node 1 going anywhere should be integrity signed using security context ID 7 with the given parameters

Security Waypoint/Destination Rules

- What is a waypoint/destination rule?
  - A definition which can be matched against a bundle
  - If block matches some criteria, then apply given security service.
- Requires 6 pieces of information

1. Bundle Source (EID)
2. Bundle Destination (EID)
3. Target Block Type

Block identification information

4. Expected Security Context ID
5. Asserted Local Security Parameters
6. Processing Actions

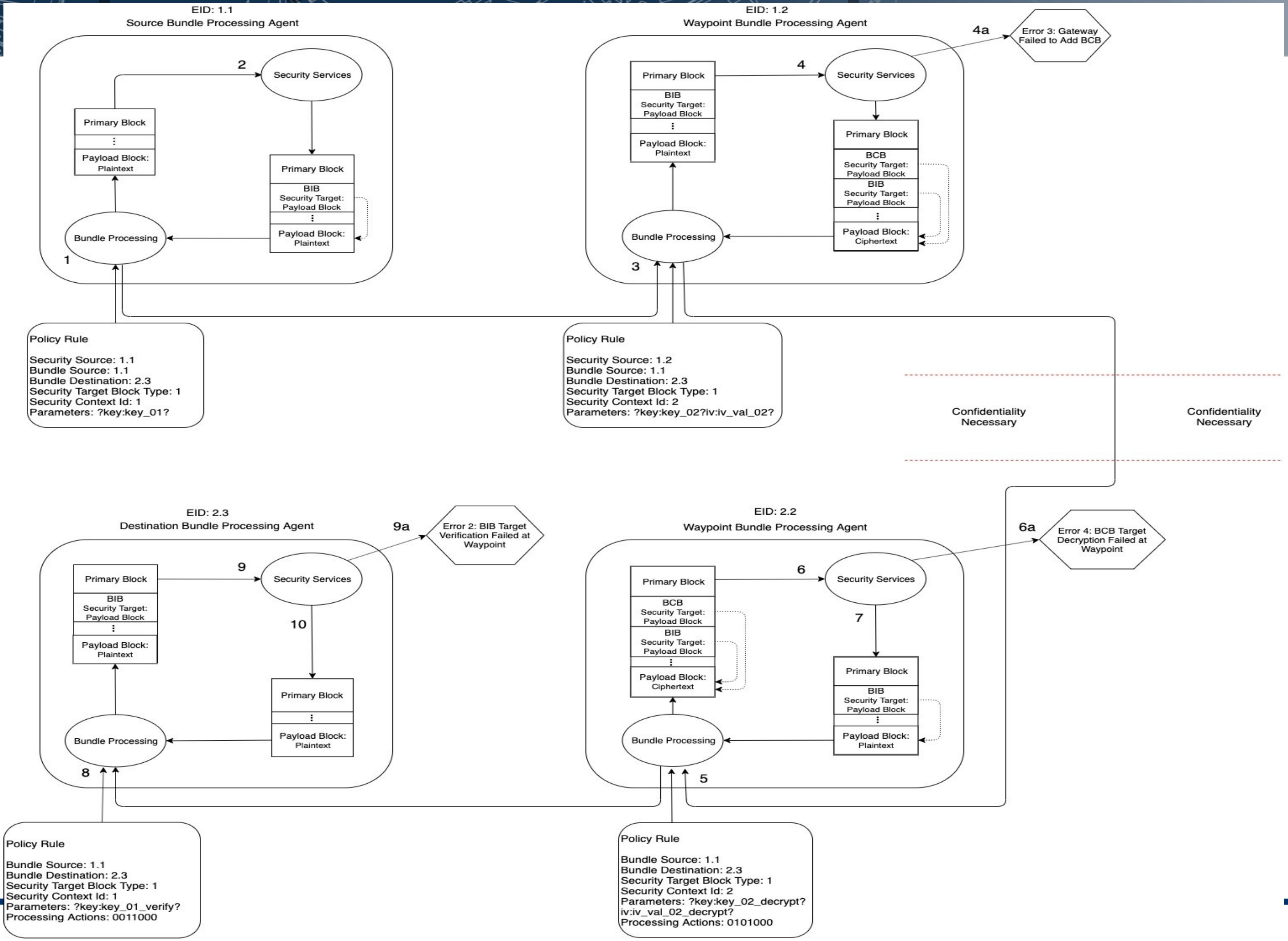
Required security service Information

- Example
  - {“ipn1.*”, “*”, 1, 7, “keyname=1”, 0xAA}
  - Any payload block from IPN node 1 must have a security source for context ID 7, verified with local parameters. On success or failure, perform following actions.

Security Waypoint/Destination Actions

- A bitfield to describe potential actions when processing a security service.
  - Bit 0 (the low-order bit, 0x01): Follow the block processing control flags of the security target which failed during processing.
  - Bit 1 (0x02): Follow the block processing control flags of the security block corresponding to the security target which failed during processing.
  - Bit 2 (0x04): Send report to bundle’s report-to EID.
  - Bit 3 (0x08): Delete the security target that failed during processing.
  - Bit 4 (0x10): Delete the security block associated with the security target that failed during processing and all of its security targets.
  - Bit 5 (0x20): Delete bundle.
  - Etc…

Bpsec policy roles – example


EID: 1.1
Source Bundle Processing Agent
2
Security Services
Primary Block
⋮
Payload Block: Plaintext
Primary Block
BIB
Security Target: Payload Block
⋮
Payload Block: Plaintext
Bundle Processing
1
EID: 1.2
Waypoint Bundle Processing Agent
4a
Error 3: Gateway Failed to Add BCB
Primary Block
BIB
Security Target: Payload Block
⋮
Payload Block: Plaintext
4
Security Services
Primary Block
BCB
Security Target: Payload Block
BIB
Security Target: Payload Block
⋮
Payload Block: Ciphertext
Bundle Processing
3
Confidentiality Necessary
Confidentiality Necessary
EID: 2.3
Destination Bundle Processing Agent
9a
Error 2: BIB Target Verification Failed at Waypoint
Primary Block
BIB
Security Target: Payload Block
⋮
Payload Block: Plaintext
9
Security Services
10
Primary Block
⋮
Payload Block: Plaintext
Bundle Processing
8
EID: 2.2
Waypoint Bundle Processing Agent
6a
Error 4: BCB Target Decryption Failed at Waypoint
Primary Block
BCB
Security Target: Payload Block
BIB
Security Target: Payload Block
⋮
Payload Block: Ciphertext
6
Security Services
7
Primary Block
BIB
Security Target: Payload Block
⋮
Payload Block: Plaintext
Bundle Processing
5

Policy Rule

Security Source: 1.1
Bundle Source: 1.1
Bundle Destination: 2.3
Security Target Block Type: 1
Security Context Id: 1
Parameters: ?key:key_01?

Policy Rule

Security Source: 1.2
Bundle Source: 1.1
Bundle Destination: 2.3
Security Target Block Type: 1
Security Context Id: 2
Parameters: ?key:key_02?iv:iv_val_02?

Policy Rule

Bundle Source: 1.1
Bundle Destination: 2.3
Security Target Block Type: 1
Security Context Id: 1
Parameters: ?key:key_01_verify?
Processing Actions: 0011000

Policy Rule

Bundle Source: 1.1
Bundle Destination: 2.3
Security Target Block Type: 1
Security Context Id: 2
Parameters: ?key:key_02_decrypt?
iv:iv_val_02_decrypt?
Processing Actions: 0101000