

# Payload Codec Proto - Spec Completeness Audit

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## Summary

Metric	Python	Go	Total
Tests Passing	401	49	450
Features Complete	31/31	31/31	31/31
Requirements Traced	70	—	70

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## Python Interpreter Tests

Feature	Status	Tests
integer_types	PASS	13
float_types	PASS	13
bool_type	PASS	8
bytes_type	PASS	10
string_type	PASS	9
enum_type	PASS	7
mult_modifier	PASS	6
div_modifier	PASS	4
add_modifier	PASS	2
lookup_modifier	PASS	5
polynomial	PASS	3
compute	PASS	15
guard	PASS	2
transform	PASS	2
ref	PASS	6
switch_match	PASS	20
flagged	PASS	7
bitfield	PASS	7
bitfield_string	PASS	4
byte_group	PASS	3
tlv	PASS	6
nested_object	PASS	7
repeat	PASS	10
ports	PASS	2
definitions	PASS	2
var	PASS	4
skip	PASS	3
endian	PASS	17
unit	PASS	2
semantic	PASS	6
formula	PASS	10

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## Go Interpreter Tests

Test	Status
TestBenchmarkResults	PASS
TestDecodeUint	PASS
TestDecodeSint	PASS
TestDecodeBits	PASS
TestCompactFormat	PASS
TestSchemaBasic	PASS
TestSchemaWithModifiers	PASS
TestSchemaWithLookup	PASS
TestSchemaWithNestedObject	PASS
TestSchemaWithMatch	PASS
TestSchemaWithVariable	PASS
TestFloat16	PASS
TestBufferUnderflow	PASS
TestTLVSimple	PASS
TestTLVCompositeTag	PASS
TestBytesHex	PASS
TestBytesHexUpper	PASS
TestBytesWithSeparator	PASS
TestBytesBase64	PASS
TestByteArray	PASS
TestRepeatCount	PASS
TestRepeatUntilEnd	PASS
TestRepeatWithVariable	PASS
TestEncodeBasic	PASS
TestEncodeWithModifiers	PASS
TestEncodeWithDiv	PASS
TestEncodeWithLookup	PASS
TestEncodeLittleEndian	PASS
TestRoundTrip	PASS
TestPortBasedSelection	PASS
TestBitfieldStringHex	PASS
TestBitfieldStringDecimal	PASS
TestFlaggedAllGroups	PASS
TestFlaggedPartialGroups	PASS
TestCrossFieldFormula	PASS
TestFormulaWithX	PASS
TestModifierYAMLKeyOrder	PASS
TestModifierYAMLKeyOrderRoundtrip	PASS
TestAlbedoFormula	PASS
TestEncodeFlaggedAllGroups	PASS
TestEncodeFlaggedBatteryOnly	PASS
TestEncodeBitfieldString	PASS
TestEncodePortBased	PASS
TestEncodeFlaggedRoundtrip	PASS
TestPolynomialEvaluation	PASS
TestComputeDiv	PASS
TestComputeMul	PASS
TestGuardWithConditions	PASS
TestRefWithTransform	PASS

**Go Test Summary:** 49 tests, 0 failures

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## Requirements Traceability

### Data Types

- REQ Unsigned-I-001: Unsigned integer types
- REQ Signed-Int-002: Signed integer types
- REQ Type-Alia-003: Type aliases (uint8, int8, etc.)
- REQ Float-Typ-007: 32-bit float
- REQ Float-Typ-008: 64-bit float
- REQ Boolean-Ty-016: Boolean type
- REQ Bytes-Type-017: Raw bytes type
- REQ String-Typ-018: String type
- REQ ASCII-Type-019: ASCII string type
- REQ Hex-Type-020: Hex string output
- REQ Skip-Type-021: Skip/padding type
- REQ Base64-Typ-057: Base64 encoding

### Bitfields

- REQ Bitfield-009: Bitfield extraction
- REQ Bitfield-010: Bitfield range syntax
- REQ Bitfield-011: Bitfield from multi-byte
- REQ Bitfield-012: Bitfield signed extraction
- REQ Bitfield-013: Bitfield consume behavior
- REQ Bitfield-014: Bitfield edge cases
- REQ Bitfield-String-069: Bitfield string output
- REQ Consume-Fi-015: Consume field behavior
- REQ Byte-Group-037: Byte group construct

### Modifiers

- REQ Arithmeti-022: Arithmetic modifiers
- REQ Modifier-O-023: Modifier ordering
- REQ Mult-Modi-024: Multiply modifier
- REQ Add-Modif-025: Add modifier
- REQ Div-Modif-026: Divide modifier
- REQ Lookup-Ta-027: Lookup table modifier
- REQ Transform-001: Transform pipeline

### Computed Fields

- REQ Formula-Fi-028: Formula field (deprecated)
- REQ Polynomial-001: Polynomial evaluation
- REQ Compute-001: Compute operations
- REQ Guard-001: Guard conditions
- REQ Encode-Formula-063: Formula encoding

### Conditional Parsing

- REQ Match-Cond-030: Match conditional
- REQ Match-Sing-032: Match single value
- REQ Match-List-033: Match value list
- REQ Match-Rang-034: Match value range
- REQ Match-Defa-035: Match default case
- REQ Match-Defa-036: Match fallback

### Structures

- REQ Nested-Obj-029: Nested objects

- REQ-Enum-Type-038: Enum type
- REQ-Enum-Value-039: Enum value mapping
- REQ-Definitio-051: Definitions section
- REQ-Ref-Field-052: \$ref field references
- REQ-Variables-070: Variable storage

## Repeat/Arrays

- REQ-Repeat-Coun-064: Count-based repeat
- REQ-Repeat-Byte-065: Byte-length repeat
- REQ-Repeat-Unti-066: Until-end repeat
- REQ-Repeat-Mini-067: Min/max constraints
- REQ-Repeat-Vari-068: Variable-based count

## Endianness

- REQ-Endiannes-004: Big endian default
- REQ-Endiannes-005: Little endian option

## Output Formats

- REQ-Output-For-040: Output formatting
- REQ-IPSO-Outpu-041: IPSO/LwM2M output
- REQ-SenML-Outp-042: SenML output
- REQ-TTN-Output-043: TTN v3 output
- REQ-Unit-Annot-071: Unit annotations

## Encoding

- REQ-Encoder-Re-044: Encoder requirements
- REQ-Roundtrip-045: Decode/encode roundtrip

## Schema Document

- REQ-Document-S-SHAL-003: Schema format
- REQ-Document-S-REQU-004: Required fields
- REQ-Document-S-REQU-008: Test vectors

## Special Features

- REQ-Timestamp-ISO-060: ISO timestamp
  - REQ-Timestamp-Elapsed-061: Elapsed time
  - REQ-Version-String-062: Version string parsing
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## Notes

- **Python Interpreter:** tools/schema\_interpreter.py - 401 tests
- **Go Interpreter:** go/schema/schema.go - 49 tests
- **Total Coverage:** 450 tests across both implementations
- All requirements traced via `REQ-*` tags in test docstrings