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Bidirectional Adaptive Frame Protocol, Version 2 (BAFP/2)

Status of This Memo

This document specifies an Internet standards-track protocol for the Internet community, and requests discussion and suggestions for improvement. Distribution of this memo is unlimited. It is subject to the terms of BCP 78 and the Trust Legal Provisions.

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Abstract
   BAFP/2 is a low-latency, bidirectional framing protocol for
   multiplexed streams over a single transport connection. It adds
   adaptive flow control and per-stream prioritization to BAFP/1
   while preserving wire compatibility for the base header.
```

1. Introduction

This document defines version 2 of the Bidirectional Adaptive Frame Protocol (BAFP/2). BAFP/2 multiplexes independent streams over one transport connection, providing per-stream flow control and prioritization with minimal head-of-line blocking.

1.1 Requirements Language

The key words **MUST**, **MUST NOT**, **REQUIRED**, **SHALL**, **SHOULD**, and **MAY** in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals.

2. Frame Format

Every BAFP/2 frame consists of a 12-byte base header, zero or more variable-length extension entries, and a payload. All multi-byte integers are in network byte order.

Field	Bits	Description
Version	4	Protocol version; **MUST** be set to `0x2`.
Type	4	Frame type (DATA, HEADERS, SETTINGS, PING, GOAWAY).
Flags	8	Type-specific boolean flags.
Stream ID	32	Unsigned stream identifier; 0 is reserved for connection control.
Sequence	16	Monotonic per-stream sequence number.
Length	32	Length of the payload in octets.

Table 1: BAFP/2 base header fields (12 octets total).

3. Flow Control

BAFP/2 uses a credit-based scheme. A receiver advertises an initial window via the `SETTINGS` frame. A sender **MUST NOT** send more payload octets on a stream than the receiver has granted. Credits are replenished with `WINDOW_UPDATE` frames.

3.1 Prioritization

Each stream carries an 8-bit weight. Endpoints **SHOULD** allocate bandwidth in proportion to weight among streams that are ready to send.

4. Error Handling

An endpoint that detects a protocol violation **MUST** terminate the connection with a `GOAWAY` frame carrying the last processed stream ID and an error code.

Code	Name	Meaning
0x0	NO_ERROR	Graceful shutdown.
0x1	PROTOCOL_ERROR	Malformed frame or state violation.
0x3	FLOW_CONTROL	Peer exceeded advertised window.
0x7	REFUSED_STREAM	Stream refused before processing.

Table 2: Selected BAFP/2 error codes.

5. Security Considerations

BAFP/2 **MUST** be run over a transport providing confidentiality and integrity (e.g. TLS 1.3). Implementations **SHOULD** bound the number of concurrent streams to mitigate resource-exhaustion attacks.

6. IANA Considerations

IANA is requested to create a “BAFP/2 Frame Types” registry and a “BAFP/2 Error Codes” registry, both with a Specification Required policy.

References

[RFC2119] Bradner, S., “Key words for use in RFCs”, BCP 14, RFC 2119, March 1997.

[RFC8174] Leiba, B., “Ambiguity of Uppercase vs Lowercase”, BCP 14, RFC 8174, May 2017.

[RFC7540] Belshe, M. et al., “HTTP/2”, RFC 7540, May 2015.