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MASQUE extension for signaling throughput advice
draft-ihlar-scone-masque-mediabitrate-03

Abstract

This document specifies a new Capsule (RFC9297) that can be used with CONNECT-UDP (RFC9298), CONNECT-IP (RFC9484), or other future CONNECT extensions to signal throughput advice for traffic that is proxied through an HTTP server.

About This Document

This note is to be removed before publishing as an RFC.

Status information for this document may be found at https://datatracker.ietf.org/doc/draft-ihlar-scone-masque-mediabitrate/.

Discussion of this document takes place on the Standard Communication with Network Elements Working Group mailing list (mailto:scone@ietf.org), which is archived at https://mailarchive.ietf.org/arch/browse/scone/. Subscribe at https://www.ietf.org/mailman/listinfo/scone/.

Source for this draft and an issue tracker can be found at https://github.com/mirjak/draft-masque-mediabitrate.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on 23 April 2026.

Table of Contents

1. Introduction

This document specifies an HTTP Capsule (RFC9297) that can be used with CONNECT-UDP (RFC9298), CONNECT-IP (RFC9484), or other future CONNECT extensions to signal throughput advice for traffic proxied through an HTTP server.

The extension can be used with the HTTP CONNECT method when the :protocol pseudo-header is equal to "connect-udp" or "connect-ip", as well as with future CONNECT protocols that use the Capsule Protocol.

2. Conventions and Definitions

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

3. Indicating Support for Throughput Advice Signaling

A client that wishes to receive throughput advice capsules can indicate support by sending a request header with the boolean-valued Item Structured Field: "Throughput-Advice: ?1". The HTTP proxy can indicate support by sending a response header with the same boolean-valued Item Structured Field: "Throughput-Advice: ?1". See Section 3.3.6 of [RFC8941] for information about the boolean format.

Once support has been established, a proxy MAY send THROUGHPUT_ADVICE capsules at any time during the lifetime of the stream that originated the request.

4. THROUGHPUT_ADVICE Capsule Type Format

The THROUGHPUT_ADVICE Capsule has the following format:

```
THROUGHPUT_ADVICE Capsule {
  Type (i) = 0xTBD,
  Length (i),
  Direction (8),
  Rate Limit (i),
  [Average Window (i)]
}
```

The capsule has the following fields:

Direction: Indicates the traffic direction to which this throughput advice applies. Valid values are:

* 0x00: Both uplink and downlink

* 0x01: Uplink (client to target)

* 0x02: Downlink (target to client)

A client MUST treat any other value as a malformed capsule.

Rate Limit: The maximum sustainable throughput that the client can expect for proxied traffic, expressed in kilobits per second.

Average Window: Indicates the duration over which the bitrate is enforced, expressed in milliseconds. If this field is omitted the average window is assumed to be 67 seconds as described in Section 5.2 of [SCONE].

5. Relationship to the SCONE Protocol

This document reuses the SCONE [SCONE] conceptual model for throughput advice but scopes signaling to the HTTP tunnel between a MASQUE client and a MASQUE server. When the Throughput-Advice header is successfully negotiated, the MASQUE server is the entity that originates THROUGHPUT_ADVICE capsules toward the client; the client does not send capsules unless specified by future extensions.

Implementations that negotiate Throughput-Advice for a MASQUE tunnel SHOULD NOT initiate or forward SCONE packets on the outer MASQUE connection for the purpose of conveying throughput advice.

When a MASQUE proxy observes SCONE packets that belong to an end-to-end inner flow carried by the tunnel, the proxy MUST forward those packets unmodified.

5.1. Interaction with QUIC-Aware Forwarding

When used in combination with QUIC-Aware Forwarding [QUIC-PROXY], QUIC long-header packets are tunnelled rather than being forwarded forwarded directly. Since SCONE packets use a dedicated QUIC version and the long-header format, they will be encapsulated automatically inside the MASQUE tunnel.

6. Applicability

A proxy that intends to rate limit proxied traffic can notify clients using the THROUGHPUT_ADVICE capsule. Reasons for rate limiting traffic through a proxy include enforcement of access network policies, proxy resource management and proxy service differentiation.

If the sole purpose of the communication between a client endpoint and a network element is the exchange of throughput advice, it is RECOMMENDED to use more lightweight approaches than HTTP proxying, such as [SCONE].

6.1. Applicability to Proxied Applications

In most MASQUE deployments, the client that terminates the HTTP tunnel is not the ultimate endpoint of the application traffic. Throughput advice therefore applies to the aggregate traffic carried by the tunnel rather than to any individual application flow.

How a MASQUE client exposes throughput advice to the applications that use the tunnel is out of scope for this document. Implementations may, for example:

* Use the advice to apply back-pressure on proxied traffic;

* Forward the information through an out-of-band API or control channel; or

* Adjust sending behavior on behalf of the application.

For CONNECT-UDP requests, the advice typically corresponds to the throughput of a single proxied flow, whereas for CONNECT-IP requests it applies to the aggregate traffic within the tunnel.

7. Security Considerations

Throughput advice influences application sending behavior and can therefore affect performance and user experience. Implementations MUST treat such signals as advisory information. A malicious or misconfigured proxy could advertise unrealistically low rate limits to degrade service quality or influence path selection and traffic distribution. Clients MAY ignore any received advice.

When QUIC-Aware Forwarding is in use, SCONE packets are encapsulated as QUIC long-header packets and therefore not visible to on-path observers. This encapsulation is RECOMMENDED since it prevents correlation between throughput-advice signaling and proxied application traffic.

8. IANA Considerations

8.1. Capsule types

This document adds following entries to the "HTTP Capsule Types" registry:

Capsule Type	Value	Specification
THROUGHPUT_ADVICE	TBD	(This document)

Table 1: New Capsule Type to register

8.2. HTTP headers

This document adds following entry to the "Hypertext Transfer Protocol (HTTP) Field Name Registry":

Field Name	Template	Status	Reference	Comments
Throughput-Advice		permanent	(This document)	

Table 2: HTTP Field Name to register

9. Normative References

[QUIC-PROXY] Pauly, T., Rosenberg, E., and D. Schinazi, "QUIC-Aware Proxying Using HTTP", Work in Progress, Internet-Draft, draft-ietf-masque-quic-proxy-07, 8 October 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-masque-quic-proxy-07>.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/rfc/rfc2119>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/rfc/rfc8174>.

[RFC8941] Nottingham, M. and P. Kamp, "Structured Field Values for HTTP", RFC 8941, DOI 10.17487/RFC8941, February 2021, <https://www.rfc-editor.org/rfc/rfc8941>.

[SCONE] Thomson, M., Huitema, C., Oku, K., Joras, M., and L. M. Ihlar, "Standard Communication with Network Elements (SCONE) Protocol", Work in Progress, Internet-Draft, draft-ietf-scone-protocol-02, 7 July 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-scone-protocol-02>.

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