Standard Communication with Network Elements
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Applicability & Manageability Considerations for SCONE
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Abstract

This document describes the Applicability and Manageability considerations for providing throughput guidance to application endpoints. This guidance is specifically addressed within the context of telecommunications service provider networks utilizing the Standard Communication with Network Elements (SCONE) protocol.

Discussion Venues

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

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

Source for this draft and an issue tracker can be found at https://github.com/ietf-wg-scone/appman.

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 11 August 2026.

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1. Introduction

The SCONE protocol [I-D.ietf-scone-protocol] provides a signaling mechanism that enables on-path, SCONE-capable network elements to communicate "throughput advice", the advisory maximum allowable bit rate, to application endpoints via SCONE packets in the telecommunications service provider networks.

Network elements capable of rate limiting can send notifications of the advisory maximum allowable bit rate in each direction of the observed traffic. This allows applications, particularly those using adaptive bit-rate (ABR) mechanisms,to proactively align their transmission rates with network policies. This document addresses the Applicability and Manageability considerations for deploying the SCONE protocol within service provider networks. It also addresses operational, configuration, and management aspects not covered in the core protocol specification.

To participate in SCONE, a network element is assumed to have the functional capability to identify and track scone compliant application flows, recognize and process SCONE packets within those flows and map network policies into throughput advice to be inserted into the SCONE packets. While on-path network elements may exist at various points between the server and the client application end-points, their specific configuration and role will influence the advice they generate. Different network architectures handle flow visibility and policy enforcement at different points. In mobile networks, for example, the User Plane Function (UPF) in 5G [_5G-Arch] and the Packet Data Network Gateway (P-GW) in 4G network [_4G-Arch] can generate throughput advice to guide ABR applications on a per-flow basis. In contrast, other environments, such as wireline broadband or Wi-Fi, may apply policies at centralized aggregation points or gateways such as the Broadband Network Gateway serving multiple devices.

Encompassing deployment of network elements in a wide range of networks, this document is limited to discussing the core Applicability and Manageability considerations for the SCONE protocol to ensure its consistent and effective use across varied network paths.

2. Terms and Definitions

This document uses terms and definitions described in [I-D.ietf-scone-protocol].

3. Applicability and Manageability Considerations

3.1. Flow session awareness

SCONE signaling operates only over established sessions. SCONE Network Elements ought to be able to unambiguously associate throughput advice with application flows. Each session is bound to an IP address and port, ensuring SCONE packets are routed precisely without affecting unrelated traffic.

3.2. Per-Flow Signaling

Throughput advice is applied on a UDP 4-tuple basis. SCONE Network Elements ought to maintain flow-specific context to ensure signaling correctness. This enables applications to receive targeted throughput advice while preventing unintended impact on unrelated flows.

3.3. QoS awareness

Quality of Service (QoS) may be enforced by networks through a variety of mechanisms. In certain deployments, network operators may choose to apply distinct QoS policies to SCONE-enabled flows. The SCONE Network Element responsible for inserting SCONE advice is not required to interpret or enforce QoS policies; its role is limited to the signaling of the advisory throughput information. It is expected that network operators shall be able to identify SCONE-enabled flows and, where appropriate, provide throughput advice in accordance to their policy objectives.

3.4. SCONE Hint to the Network

SCONE-aware applications ought to provide hints to the SCONE Network Elements, enabling it to generate appropriate throughput advice for a given UDP 4-tuple. Such hints prevent unnecessary default rate-limiting, allow the network to signal the maximum allowable bit rate, and reduce CPU overhead by eliminating additional classification steps.

3.5. Retransmission of Advised Bit-Rate

Packet loss or non-delivery of SCONE advice reduces its effectiveness. Both SCONE Network Elements and application endpoints should support retransmission or periodic re-sending of SCONE packets to ensure reliable delivery. Conformance depends on the behavior of both network and application endpoint.

3.6. Frequency of Updates

The rate at which SCONE updates are issued depends on flow characteristics and available computational resources. Excessively frequent updates may increase CPU load, while infrequent updates may reduce advisory effectiveness. Network Operators can define adjustable update intervals based on application requirements, network capacity, and operational constraints.

3.7. Dynamic Updates

Dynamic rate limits updates can be enforced by the network during active application sessions due to:

* Changes in access network type (requiring updated throughput advice)

* Changes in Subscriber policy (e.g., exceeding usage thresholds)

In such cases, the SCONE Network Elements need to be able to initiate SCONE packets to provide updated advice, or applications should generate SCONE packets frequently enough to trigger network responses.

3.8. Monitoring and Logging

SCONE signaling can be integrated into existing operational and management frameworks to enable monitoring, troubleshooting, and fault isolation. Metrics of interest include:

* Rate of SCONE advisory messages issued per session

* Correlation between SCONE advisories and user-plane throughput changes

* Error conditions where SCONE signaling fails to reach the intended endpoints

3.9. Conformance Monitoring

Networks providing SCONE throughput advice ought to implement mechanisms to measure compliance, either per application flow or in aggregate. This allows operators to validate advisory effectiveness and adjust policies. Due to flow awareness, such mechanisms are typically implemented in a SCONE Network Element but may also be implemented elsewhere in the network.

3.10. Standards Compliance

SCONE signaling is expected to traverse the existing data path associated with the UDP 4-tuple flow for which the Network Element intends to send the advisory bit-rate.

3.11. Interworking with Other Congestion Management Mechanisms

SCONE is distinct from transport-level congestion control mechanisms, such as Explicit Congestion Notification (ECN) or Low Latency, Low Loss, and Scalable Throughput (L4S). While congestion control operates on short timescales to manage transient congestion caused by varying link conditions or instantaneous load, SCONE provides throughput advice based on relatively stable network policies or capacity management goals. ECN/L4S based congestion control works at transport level and SCONE works at application level. SCONE does not replace the need for endpoints to perform congestion control or network to provide explicit or implicit congestion signals; rather, it complements these mechanisms by providing a variable range for application-level rate adaptation. In environments where both are present, SCONE and congestion control mechanisms co-exist: congestion control manages the immediate dynamics of the bottleneck link, while SCONE informs the application of the maximum sustained rate allowed by policy. Network Operators would benefit from harmonizing multiple congestion signaling methods by policy or scope deployments to avoid conflicting feedback.

4. Security Considerations

Security considerations are included separately in the SCONE protocol documents.

5. IANA Considerations

This document has no IANA actions.

6. References

6.1. Normative References

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

6.2. Informative References

[_4G-Arch] 3GPP, "System Architecture for the Evolved Packet Core (EPC)", 1 June 2020, <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=24300>.

[_5G-Arch] 3GPP, "System Architecture for the 5G System (5GS)", 7 January 2025, <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3144>.

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