QUIC Working Group
Internet-Draft
Intended status: Informational
Expires: April 28, 2022

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October 25, 2021

Multipath-QUIC Use Cases
draft-liu-quic-mpquic-usecase-00

Abstract

This draft introduces the use cases of multipath QUIC.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [1].

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1. Introduction

This draft introduces multipath QUIC use cases.

2. Use Case 1: Redundant Transmission

For applications such as Internet live video broadcasting, the user experience is very sensitive to delay. Especially for outdoor Internet live video broadcasting, the broadcasting device may equip two more cellphone cards to enable stable and robust network connection.

In this case, multipath QUIC can provide redundant transmission over multiple network connections to improve user experience. For example, when some broadcasting packets were lost in one network connection, the redundant packets can be transmitted immediately by another connection without waiting for the timeout of the acknowledgements packets.

3. Use Case 2: bandwidth Aggregation

For applications such as file download etc., if the device has multiple network access, for example, most smart phone today have both Wi-Fi and cellular network access, multipath QUIC can be used for bandwidth aggregation to accelerate the download speed.

4. Use Case 3: Use Cases in 5G Core Network

Use case 3.1: 5GS is required to extend the bandwidth for the applications, such as high resolution video streaming. To achieve this purpose, the application is enabled to be access via different RAN, for example, different wireless access from PLMNs. Since 5GS can only support multipath for TCP and can not support multipath

functionality for non-TCP traffic, there is an urgent need for the multipath transport protocol for non-TCP traffic. The traffic splitting functionality in 5GS can be further enhanced by adopting QUIC with multipath extension, ensuring the bandwidth requirement for applications, such as high resolution video streaming.

The NF (e.g. UPF) within 5GC may take charge of the QUIC multipath extension proxy functionality, which communicate with the multipath functionality in the client by using the QUIC multipath extension protocol.

The ongoing discussion on 3GPP SA2 ATSSS R18 study item covers the research item and related requirement for the continue study of traffic splitting by considering the QUIC with multipath extension. The link for the draft of the study item is: https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_147E_Electronic_2021-10/Docs/S2-2107635.zip

Use case 3.2: 5GS is required to ensure the reliability and QoE for applications, such as live video streaming, video on demand, etc. To achieve this purpose, the application is enabled to be accessed via different wireless paths, for example, 5G and Wi-Fi. However, due to the varied wireless environment, the packet sent by one path might be lost because of the poor signal and/or wireless interference. In this case, redundant transmission based on multipath is needed for guaranteeing reliability and QoE once the performance of the original path is deteriorated. The alternative path(s) may be able to send duplicated packets to the client in order to ensure the QoE.

The NF (e.g. UPF) within 5GC may take charge of the QUIC multipath extension proxy functionality, which communicate with the multipath functionality in the client by using the QUIC multipath extension protocol.

3GPP SA2 has an ongoing discussion on ATSSS R18 study item. The redundant steering functionality has been written in the latest draft, which reflects the requirement on the redundant transmission. The link for the draft is: https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_147E_Electronic_2021-10/Docs/S2-2107635.zip

5. Acknowledgements

6. IANA Considerations

This memo includes no request to IANA.

7. Security Considerations

None

8. Normative References

[1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", March 1997, <http://xml.resource.org/public/rfc/html/rfc2119.html>.

[2] Rose, M., "Writing I-Ds and RFCs using XML", RFC 2629, DOI 10.17487/RFC2629, June 1999, <https://www.rfc-editor.org/info/rfc2629>.

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