

Multipath extension for QUIC

Draft-ietf-quic-multipath-15

QUIC meeting @ IETF-123 Madrid

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Agenda

- ❖ Brief Summary: Changes from draft -14 to draft -15
 - -13 was a big editorial clean-up before WGLC
- ❖ Remaining Issues
- ❖ Final Steps

Diff from -14 to -15

- Renamed status frames and transport error codes used in the PATH_ABANDON frame (next slide)
- Fixed examples of new path establishment and AEAD nonce calculation.
- Various Clarifications (which imply some changes in normative language):
 - It's not recommend to send keep-alives as it can create unnecessary overhead, especially if there are other actively used paths.
 - Connection closure follows RFC 9000 but which PTO? Closing and draining connection states "SHOULD persist for at least three times the largest PTO among all paths"
 - If an endpoint sends a PATH_RESPONSE, it MUST be sent on the same path as used by the packet that contained the PATH_CHALLENGE frame, using a connection ID associated with the same path ID.
 - Migration (4-tuple change within path ID) "MUST be treated as path migration, as specified in Section 9.3 of [QUIC-TRANSPORT], with the constraint that all connection IDs used during path migration MUST be associated with the current path ID of the path being migrated"
 - "with the multipath extension multiple paths could use the same 4-tuple but might have different MPS"
- Improved discussion of DoS attacks
- And a bunch of editorial improvements (Thanks to all contributors!)

Renaming Status Frames and Error Codes

Frames

- PATH_AVAILABLE -> PATH_STATUS_AVAILABLE
- PATH_BACKUP -> PATH_STATUS_BACKUP

Error codes

- APPLICATION_ABANDON -> APPLICATION_ABANDON_PATH
- RESOURCE_LIMIT_REACHED -> PATH_RESOURCE_LIMIT_REACHED
- UNSTABLE_INTERFACE -> PATH_UNSTABLE_INTERFACE
- NO_CID_AVAILABLE -> NO_CIS_AVAILABLE_FOR_PATH

Issue [#557](#): Missing PATH_ABANDON codes

Should PATH_UNSTABLE_INTERFACE be split up in more error codes? E.g.

- COMMUNICATION_FAILED and POOR_PERFORMANCE
 - These cases are currently bit covered by PATH_UNSTABLE_INTERFACE". Is there a real difference?
- TIMED_OUT
 - For the condition "path as not been used for a long time, don't need it anymore."
APPLICATION_ABANDON could/should be used as this is a regular close and not an error.

Proposed action: none (expect maybe renaming the current error code?)

Issue [#558](#): Uncoordinated abandonment of paths

Do we need provide more guidance on the “uncoordinated abandonment” case for two paths on the same 4-tuple? Or just remove this guidance at all?

Currently the text says:

Uncoordinated abandon [sic] of both endpoints may result in deleting both paths instead of just one. To avoid this pitfall, endpoints could adopt a simple coordination rule, such as only letting the client initiate closure of duplicate paths, or perhaps relying on the application protocol to decide which paths should be closed.

Issue [#550](#): Why isn't NEW_TOKEN path-specific?

Current text:

As specified in Section 9.3 of [QUIC-TRANSPORT], the server is expected to send a new address validation token to a client following the successful validation of a new client address. The client will receive several tokens. When considering using a token for subsequent connections, it might be difficult for the client to pick the "right" token among multiple tokens obtained in a previous connection. The client is likely to fall back to the strategy specified in Section 8.1.3 of [QUIC-TRANSPORT], i.e., pick the last received token. To avoid issues when clients make the "wrong" choice, a server SHOULD issue tokens that are capable of validating any of the previously validated addresses. Further guidance on token usage can be found in Section 8.1.3 of [QUIC-TRANSPORT].

Question: Is it acceptable to have the token recipient assume that the token vendor is able to remember EVERY address that was in use?

Counter proposal: Have token bound to path

This was discussed ([#248](#)): Do we need to change? Or just document assumptions better?

Two editorial issues

- [#586](#): Migration/Probing (was: Use of "data packet")
- [#556](#): 3 PTO requirement for PATH_ABANDON

Final steps

- WGLC passed
 - Thanks to all reviewers, especially Martin Thomson and Tommy Pauly!
- Latest revision addresses most of the issues
- New revision planned after the meeting to address remaining 3-5 issues