

SCION Pathdiscovery - Design and Implementation of a Multipath library

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SCION Pathdiscovery

- Leverage SCION's path-awareness to discover fast and reliable content lookup and delivery
- Pathselection to find an "optimal" pathset
- Multipath usage to lookup and deliver content

Goal: Design, implement and evaluate a multipath library, mainly supporting Bittorrent, but also other applications

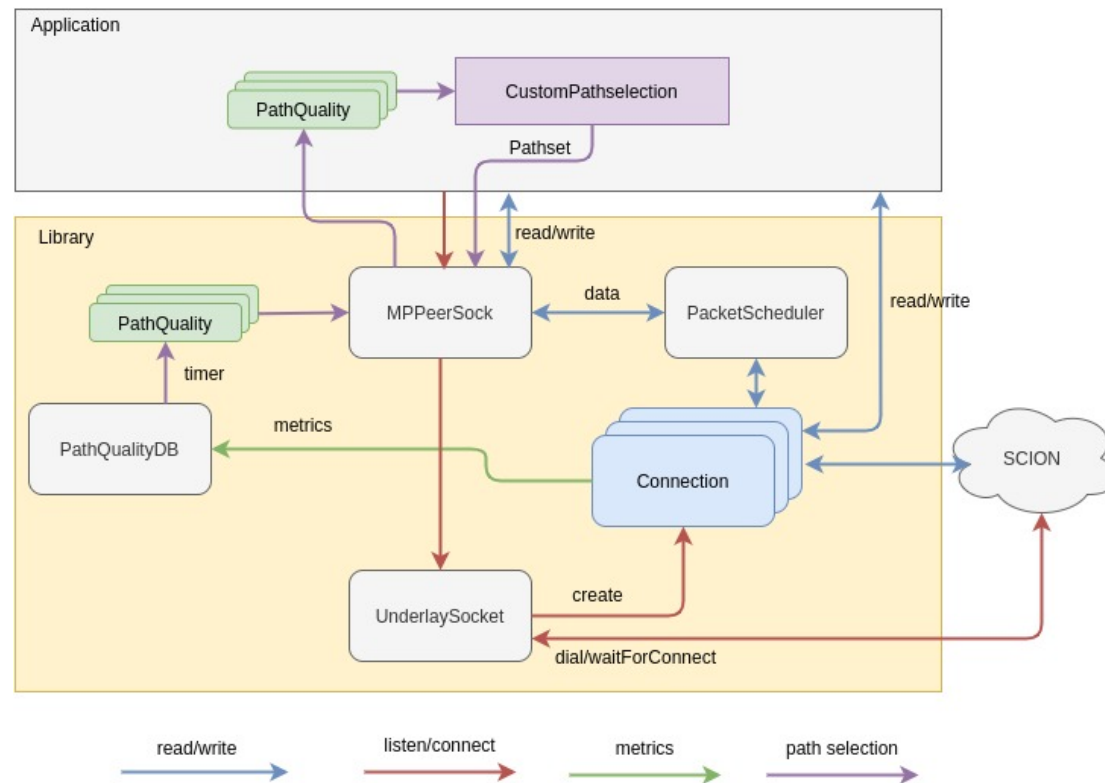
Additional Goals

- Provide an interface for customizable Pathselection to applications
- Provide abstractions that may be used independently
- Reuse existing projects for collecting information (e.g. RTT) and for path failover
- Provide a library that will hopefully support other applications than Bittorrent

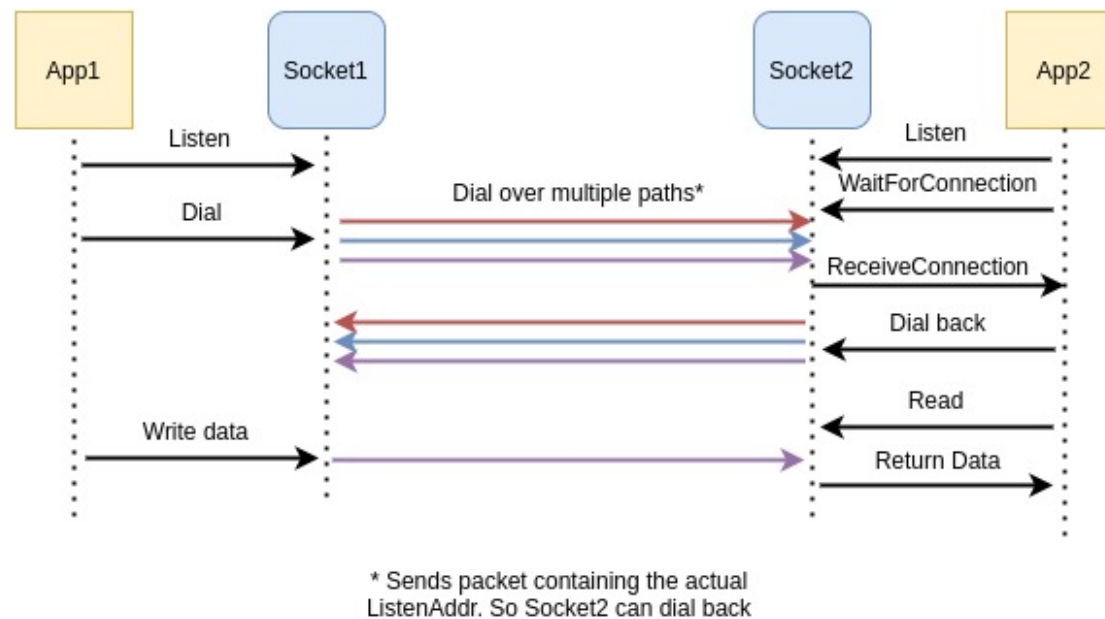
Current State

- Prototype implementation done so far
- SCION/UDP socket implemented, SCION/QUIC will be the next
- Customizable pathselection with useful defaults implemented
- Starting to extend collection of information for pathselection

Design

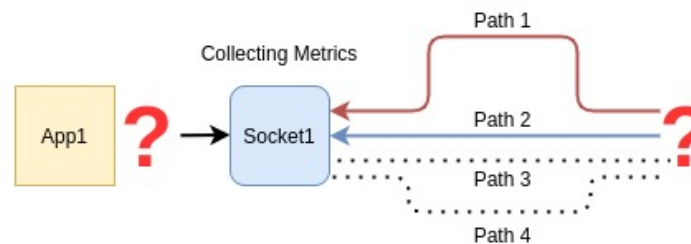


Connection setup



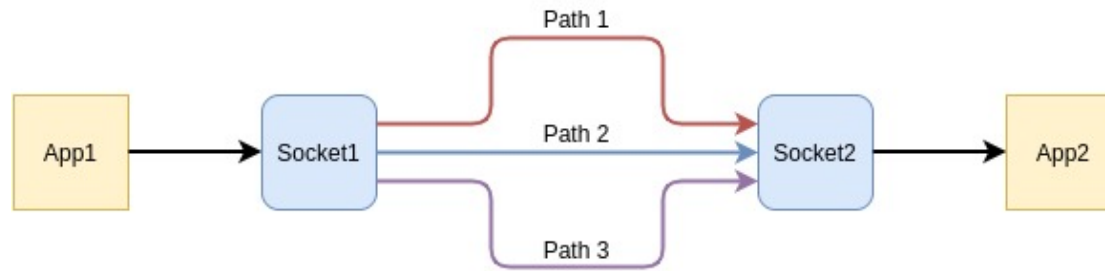
- Goal: Support independent multipath in both directions

Challenges: Collecting Information



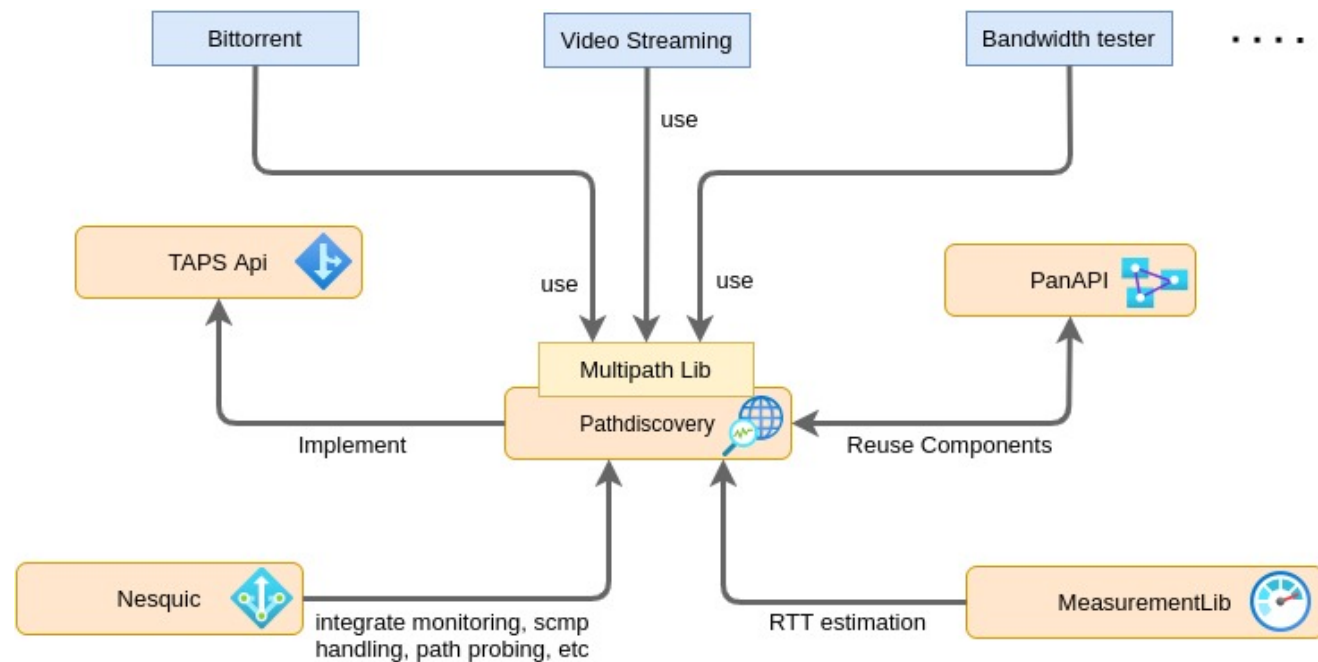
- Passive measurements are more favorite
- Socket itself does not know if full bandwidth is used, if responses are sent back immediatly, etc
- Without further knowledge, only estimations possible

Challenges: Hidden Multipath



- Idea: Application writes a stream of data that is distributed over multiple paths
- But: Without dedicated multipath protocol, data will probably arrive out-of-order
- E.g. In Bittorrent not required, each path could be seen as peer

Challenge: Combine existing projects



Conclusion

- Implement general-purpose multipath library is hard
- Without further knowledge, passive measurements are difficult
- Implementing "hidden" multipath is really challenging (and maybe not worth the effort?)
- Significantly different requirements of applications increase difficulty for multipath libraries
- But: We have already a lot of knowledge and code, that we could combine

Next steps

- Apply multithread library to Bittorrent over SCION
- Move out of prototype status
- Start merging features of existing projects
- **And: Get feedback to create an easily (re)usable and helpful library**

Thanks for your attention!

Please feel invited to share your feedback and any related projects with me!