Massive Multipathing

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Background:

We have a traxxas RC car with a raspberry pi, GoPro Hero cam and a 5G Modem. To communicate with the car over the network for video streaming, issuing control commands, etc., we have developed a Web Real-Time Communication (WebRTC) framework. The framework is built on Pion (https://pion.ly/).

The Raspberry pi will be connected to multiple internet uplinks; 5G, sunet (eduroam wifi/ethernet) and possibly starlink (ethernet/wifi). To optimize the uplink (video) and downlink (control commands) depending on the congestion or radio parameters it would be beneficial to use multiple paths. WebRTC has built in support for multiple “connection points” (pairs) but they will not be used in parallel.

Task:

Optimize the connection to utilize all possible up/downlinks at the same time.

Epic:

The system will build upon previous project(s): https://git.cs.kau.se/research/dwr/picarl that have done the basic work.

The exact epics and sub-task will be discussed and evaluated with the development team. but should consist of the following:

- Implementation of multipath support in Pion WebRTC
- Evaluation of different multipath strategies

Legal and Technical Requirements:

The source code produced in this project should be published under a copyleft license (i.e. GPL 3).

Focus will be on product readiness and stability. All code must adhere to common best practices and follow standardized language conventions.

Code checks, tests and build procedures should be automated (gitlab-ci) as much as possible and the outcome (build package) should directly be installable in the host OS (Raspberry Pi debian bulleseye).

The CS department at KaU will provide the car, raspberry pies, a public facing server for the webrtc parts and provide the repositories and help with setting up repositories.