Abstract

The new Stream Control Transmission Protocol (SCTP) was originally standardised for the transport of signaling messages – originating from the Common Channel Signaling System No.7 (SS7) – over IP based networks. Nonetheless, SCTP is a general purpose IP-based reliable transport protocol which is connection oriented and offers message based data transfer. It supports multiple independent message streams and flexible data delivery mechanisms. In contrast to TCP, SCTP protocol endpoints support multiple addresses (multihoming), and therefore an endpoint may be reached via different and possibly redundant network paths. Several SCTP enhancements, e.g. for partially reliable message transfer [82], are currently being proposed, and it is conceivable that SCTP is a suitable transport protocol for many established and future applications [5, 20].

In this thesis, the behaviour and performance of SCTP was investigated within different scenarios. A suite of tools were developed to this end: in a testbed environment, a Unix-based protocol implementation named *sctplib* was created for demonstrating SCTP fairness towards TCP, and the applicability of SCTP for signaling transport was investigated.

Discrete event-based simulation models of the SCTP data path and some control path elements were created and validated against the results from the testbed experiments. These models were later enhanced to investigate the simultaneous use of several available paths (also named *load sharing*). From an operator perspective, load sharing is desirable for signaling transport at high network loads, even though it requires substantial protocol adaptations. Load sharing mechanisms from the literature were evaluated, and a number of modifications of these algorithms were suggested and evaluated, as well.

It could be shown that the modifications of the existing load sharing algorithms that were developed within the scope of this dissertation indeed lead to an optimisation of the load sharing algorithms so far proposed, both in terms of overall throughput and maximum message delay that can be expected.

Keywords:
SCTP, Transport Protocol, Performance Evaluation, Load Sharing