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Dissertation press release 11.09.2020

A new look at fairness in networking

Title of the dissertation	Resource Assignments in Network Data Transport
Contents of the dissertation	When using Internet and communication services, we share the resources provided by the communication networks which connect the plenitudes of endpoints. The collective data in transit consume network bandwidth which is a finite resource. There are various schemes of distributing such resources among the participating endpoints. The general prescription is to treat the data flows in communication networks equally in terms of resource assignments. Internet data transmission is enabled by various mechanisms, of which, Transmission Control Protocol (TCP) is the dominant one. Traditional TCP treats all flows as equal regardless of their end utility and attempts to provide equal share of the network bandwidth to each. In this research, short and long data transfers are considered unequal (in terms of their utility as well as their ability to cope with network signals). Thus, an alternate TCP variant was developed in the research that enables flows to obtain bandwidth as a function of their flow lengths. The research provides analysis and performance evaluations of the protocol under multiple scenarios. The benefits are quantified in terms of file transfers as well as web page loads over various network conditions. The research also provides a socio-economic analysis of the resource assignment problem. It ties the origins and development of fairness notions in the society at large to the resource assignment schemes in communication networks. The effect of prioritization under different fairness notions as well as under different proportions of participants are analysed. The non-commutative property of resource assignment schemes when they occur in cascades is demonstrated. By bringing out such issues of distributive justice in network communications, a set of guidelines is prescribed to help network architects, designers and administrators to implement appropriate systems.
Field of the dissertation	Networking Technology
Doctoral candidate	Gautam Raj Moktan, M.Sc. (tech.) Born in Nepal, 1985
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Opponent	Professor Tommi Mikkonen, University of Helsinki, Finland
Custos	Professor Jukka. Manner., Aalto University, School of Electrical Engineering, Department of communications and networking
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A doctoral dissertation is a public document and shall be available at Aalto University, School of Electrical Engineering, Maarintie 8, main hall at the latest 10 days prior to public defence.