Dr. Lav Gupta receives the Computer Communications Best Paper Award for 2020

Optimal Virtual Network function placement in multi-cloud service function chaining architecture

Advancements in Software Defined Networking (SDN), Network Function Virtualization (NFV) and Cloud Computing have allowed network services and applications to be deployed as virtual network functions (VNFs) over clouds. An unprecedented increase in dynamic user demand and network traffic has resulted because of data and computations moving closer to the end users. Cloud service providers have chosen to deploy services as sets of virtual network services (VNSs). With growing number of VNSs, the task of managing these becomes daunting. Service Function Chaining (SFC) allows various VNSs to be connected to each other to form larger end-to-end service chains. The problem in service function chaining is to deploy various network service instances over geographically distributed data centers and providing inter-connectivity among them such that the network traffic flows smoothly and the end-user gets good quality of experience. This paper sets up the problem of minimizing inter-cloud traffic and response time in a multi-cloud scenario as an ILP optimization problem, along with important constraints such as total deployment costs and service level agreements (SLAs). In addition, a novel affinity-based approach (ABA) has been used to solve the problem for larger networks. The paper shows that the affinity-based approach for placing the service functions in the network produces solves larger problems more quickly than ILP and gives better results compared to the simple greedy (First Fit Decreasing) approach in terms of both, total delays and total resource cost.