Changing User Behaviour in Future Services

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In future Internet, multi-network services correspond to a new paradigm that intelligence in network control is gradually moved to the edge of the network. As a consequence, the application itself can influence or determine the amount of consumed bandwidth. Thus the shift of the control intelligence to the edge is accompanied with the fact that the observed user behaviour changes. A user can appear altruistic or selfish. Selfish user behaviour means that the user or the application tries to maximize the user-perceived Quality of Experience QoE rather than to optimize the network Quality of Service QoS. Very often the selfish behaviour is implemented in the software downloaded by the user without his explicit notice. In contrast, altruistic users, whose behaviour is instructed by network provider traffic control protocols (like TCP) help to maximize the overall system performance in a fair manner. In the case of file-sharing platforms, an altruistic user is willing to upload data to other users, while a selfish user only wants to download without contributing to the network. For voice over IP (VoIP), altruistic users would reduce the consumed bandwidth in the case of facing congestion, while selfish users would continuously try to achieve a high goodput and QoE, no matter of consequences for other users.

In this talk, we look at the user behaviour of current applications to estimate this for future applications. We demonstrate the changing user behaviour on the example of the Skype VoIP telephony and P2P content distribution networks like eDonkey or BitTorrent. In both cases, we observe selfish user behaviour. In the latter case, we show that cooperative users in a community help each other to shorten the download time of content. These edge-based services also invoke new problems, like the appearance of malicious peers from the edge which pollute and disturb the entire system.

The observations of changes in the user behaviour of emerging applications are important for the performance evaluation of future services as well as network dimensioning. In future, more applications are expected with such a changing user behaviour and which are designed mainly be the edge and controlled by an overlay.