Internship proposal 2016/2017

Topic: Profiling user Internet usage for traffic prioritization

Duration: 4 to 6 months

Hosting team: Muse, Inria Paris (https://team.inria.fr/muse/)

Apply at: https://team.inria.fr/muse/join-us-2/

Mentor:
Francesco Bronzino, Post-doc, Inria
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Keywords: Internet measurements, network traffic, user profiling, traffic prioritization

Description:
Despite the rapid growth in broadband access and service speeds, for many users bandwidth availability is and will remain a challenge. First, applications require more and more bandwidth (for example, 8K video streaming can require up to 500 Mbps). Second, multiple users share a single home connection and the number of devices per users is increasing. The congestion that results from the competition among applications can degrade users' Quality of Experience (QoE). To alleviate this problem, a number of research efforts explore ways to label and prioritize user-facing traffic [1, 2, 3], i.e., traffic that directly impacts users' QoE. Their main observation is that even though a number of applications can be running on the background (e.g., software updates or refreshes of web pages in the background tab), users only care about the few applications she is interacting with. One challenging issue in this line of research is to be able to automatically identify user-facing traffic.

The goal of this internship is to profile Internet usage to better understand the potential for traffic prioritization. The student will analyze various datasets to characterize how often user-facing traffic competes with other background traffic. This study will benefit from datasets collected from users' devices in the context the European project called "User-Centric Networking (UCN)"[1] as well as the in-house project HostView [4]. These datasets contain network traffic, running applications, and device location from dozens of users. The student will first identify methods to identify user-facing traffic. Then, the student will characterize the network usage of user-facing and background traffic. Usage may differ considerably depending on the network the device is connected to (for example, whether the device is connected a home, work, or at a public WiFi hotspot). The students will explore these differences during the analysis. Finally, the student will study which traffic prioritization policies would achieve the best QoE for the studied users.

The student should develop scientific skills on Internet measurements and data mining as well as scientific writing and presentation. If the student is interested, there is a possibility of staying for the doctoral studies after the internship.

Desirable skills:
- Comfortable communicating in English
- Knowledge of data analysis techniques
- Knowledge of network traffic measurements
- Knowledge of matlab or gnu R

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[1] http://usercentricnetworking.eu

References

[1] I. N. Bozkurt and T. Benson. **Contextual router: Advancing experience oriented networking to the home.** In Proc. of SOSR, 2016.

[2] J. Martin and N. Feamster. **User-driven dynamic traffic prioritization for home networks.** In Proc. of W-MUST, 2012.

[3] Y. Yiakoumis, S. Katti, N. McKeown. **Neutral Net Neutrality.** In Proc. of ACM SIGCOMM, 2016.

[4] D. Joumblatt, R. Teixeira, J. Chandrashekar, N. Taft, "HostView: Annotating end-host performance measurements with user feedback", in Proc. of ACM HotMetrics Workshop, 2010.