Invitation à la soutenance publique de thèse de
Monsieur Olivier TILMANS
Master ingénieur civil en informatique

Pour l'obtention du grade de Docteur en sciences
« Improving network flexibility »

qui se déroulera
le lundi 07 janvier 2019 à 14h
Auditoire LECL 61
Place Montesquieu, 1
1348 Louvain-la-Neuve

Membres du jury :
Prof. Olivier Bonaventure (UCLouvain), supervisor
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Computer networks are deeply ingrained in our daily lives. We rely on them to place audio calls, to watch movies, or even to automate parts of our houses. Each of these use-cases comes with its own requirements to ensure its proper operation and generates unique traffic patterns. For example, video streams require a large amount of bandwidth from a server to the client, for the duration of the video. Efficiently supporting many requirements, potentially changing over time, requires networks to be flexible. In this thesis, we study and improve two key aspects of network flexibility.

First, we tackle the issue of flexible network control by introducing Fibbing, a technique which achieves a central control over distributed routing protocols. We present the theory behind Fibbing using provably-correct algorithms, as well as a prototype controller which is compatible with unmodified commercial routers. Our algorithms scale to large Internet Service Provider (ISP) topologies, and measurements confirmed that Fibbing’s overhead on real routers is negligible.

Second, we explore how to improve the flexibility of network monitoring systems from two vantage points.

On one hand, we present how ISPs can use Stroboscope to combine the visibility of traffic mirroring with the scalability of sampling. Stroboscope achieves deterministic traffic sampling by simultaneously (de)activating traffic mirroring on specific routers, for specific flows, at specific moments in time. As a result, Stroboscope enables network-wide path tracing while adhering to a strict monitoring budget.

On the other hand, we present how enterprise networks can monitor their networks with Flowcorder. Flowcorder records performance profile of connections by instrumenting the protocol implementations of the end hosts. Doing so, it transparently supports encrypted and multipath protocols. We demonstrate the feasibility of the approach by presenting measurement collected with a prototype in a campus network.