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REVIEW

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Of the *member* of the dissertation council for the dissertation of *Sergey Igorevic Nikolenko* on the topic: "Algorithms for Networking Problems and their Theoretical Analysis.", submitted for the degree of *doctor* of sciences in a scientific speciality Physics and Mathematics.

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Algorithms for Networking Problems and their Theoretical Analysis

This thesis makes contributions in three foundational areas of communications systems

Buffer management

In work conserving packet switched networks like the Internet, switches must manage finite memory resources, which an be overrun by excessive (e.g. bursty) demand flows. A number of different policies can be implemented for packet drop, which have an impact on end to end performace. These schemes have surprisingly complex interactions and so self-tuning via machine learning is a viable approach.

Packet Classification

Traffic needs to be managed to meet different demand types, but in networks without explicit packet labelling or connection setup, it is necessary to classify packets based on a number of fields and rules, so flows of packets can be treated appropriately. Given the somewhat loose definite of QoS in the Internet, approximate classification may be applicable.

Topological Considerations for Control Planes

Control plane protocols (routing, traffic engineering, load balancing, etc) assign packet flows to paths and treatments on those paths. The complexity of any given control plane scheme is dependent on topology and on node and link resources. There are ways to simplify the

algorithms based in aggregating resources (topological, communications and compute, for cloud) that can get to near optimal execution time.

The thesis has resulted in a large number of publications in world leading venues (notably multiple papers in the IEEE Transactions on Networks, as well as highly cited conferences such as ICNP, IEEE Infocom and ACM Sigcomm, and is an impressive contribution to research knowledge in the area, and very worthy of the Doctorate.

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Dissertation of *Full name* on the topic: "Algorithms for Networking Problems and their Theoretical Analysis" *meets* the basic requirements established by Order No.11181/1 dd. 19.11.2021 "On the procedure for awarding academic degrees at St. Petersburg State University". The applicant *Sergey Igorevic Nikolenk deserves* to be awarded the academic degreeof *doctor* of sciences in a scientific speciality Physics and Mathematics Paragraphs 9 and 11 of the specified Order have not been violated.

Member of the Dissertation Council

Academic degree, academic title, position   Professor Jon Crowcroft, PhD,

Marconi Professor of Communications Systems, University of Cambridge, UK,

Signature

Full name Jonathan Andrew Crowcroft

Date 28th July 2022