Master Thesis – Using Graphical Processors (GPU) to Implement RBS Control Plane Functions

Background
The RAN (Radio Access Network) consist of clusters RBS:s (Radio Base Stations), in 4G (LTE) and 5G (NR). The RBS is divided into control plane and user plane. The two are collaborating, but with differences in characteristics. User plane is a pipelined function, handles large number of parallel data flows, is a hard realtime system. User plane have usually been realized using highly customized pipeline optimized processors (EMCA:s).

Control plane is a semi-hard realtime system, is event driven, and deals multiple layers of large (Node)-to-small (Cell/User) scale data driven decision loops (logic). It has traditionally been realized with single or multicore general purpose CPU:s (PowerPC, Intel X86, ARM).

In LTE the control plane software contains highly parallelable parts, as well as singletons. Following Almdahl’s law the singletons pose significant constrains on the maximum speed up that can be achieved by adding more processors. The purpose of this thesis is to analyze and evaluate the feasibility of realizing, or accelerating, the control plane using off-the-shelf available many core processors, such as graphic processors (GPU:s)

Thesis Description
• Investigate the possibilities, benefits and limitation of adapting the full or parts (Offloading) of the control plane to start utilizing pipeline processors. The analysis shall cover configuration, performance measurements and traffic domains.
• Implement a prof of concept for a suitable part of the control plane, benchmark portion towards baseline. Using CUDA (Nvidia), open-CL (Open source), or FLAKE (Ericsson proprietary).

Qualifications
This project aims at students in computer science, computer engineering or similar.

Extent
1-2 students, 30hp each

Location
Ericsson AB Mjärdevi, Linköping

Preferred Starting Date
Spring 2019

Keywords
Parallel computing, graphics processors, distributed systems, CUDA/Open-CL

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