ENCQOR 5G Technology Development Challenge

Multi-Access Edge Optimization with BP AI Framework

Challenge Launch Date	October 16, 2019
Challenge Deadline	November 13, 2019
Challenge Statement	The evolution and rapid progression of new technologies like augmented reality, autonomous vehicles, drones, and smart cities are inevitable and the processing power demands are increasing and requiring very low latency, in the millisecond range. The demand for real-time processing capabilities at the edge along with AI and machine learning will ultimately revolutionize the fabric of our society. As a result, deep neural networks and the development of probability models are a requirement for the development of EDGE AI. The key is to provide AI functionality at the edge because it provides a more effective control of networks, cells and devices.
Project Partner	Ciena (Blue Planet AI)
Timeline	2 years
Available funding	Up to $500 000
Applicant Type	Ontario based SME Scale company
Location	Activities can be completed at the SME company site
Project Details	The main research topic will be the optimization of limited radio resources, and optimal placement of functions for unprecedented high-volume low latency consumption anticipated with new breed of use-cases enabled with 5G (autonomous cars, connected cities, etc) using AI. Each key function (RAN, CORE, Transport) will be self-optimized driven by AI (closed control loop). The research proposal is also to investigate and create an AI framework by initially performing a feasibility study on existing AI frameworks (Torch, Caffee etc) vs creating a new AI Framework on which Deep Learning algorithms will be based and developed. Ciena is also interested in exploring the orchestration/optimization, management and dynamic resource allocations (VNF Autoscaling) at the edge (Local control closed loop), managing different functional placements for transport, CORE, split RAN and EDGE Compute driven by AI. Areas for analysis and development: 1. Framework for distributed AI a. Initial Feasibility Study and Analysis on existing AI Frameworks

	b. Pending outcome of Feasibility Study – Develop AI Framework c. Develop Deep Learning AI Algorithms 2. Develop AI/ML models for each of the following: a. Disaggregated RAN: Optimize Radio resource allocation b. CORE: Optimization of Control and User Plane c. Transport: Optimization of transport (Backhaul, Fronthaul) d. Application: Optimization of workload location and distribution. 3. Validation with use cases. This could be a workload placement for a given use SLA. This will involve RAN/Transport and Core The selected SME will help analyze and architect a possible solution on how to distribute AI moving from centralized model to distributed models in conjunction with Blue Planet AI assets (a division of Ciena). Concurrently, the SME team will be developing and evolving the software used to process the information above including the software architecture and AI coding. This software will be developed in concert with customer engagement and will adapt based on customer feedback becoming complete once it is ready for customer deployment.
Project Goals/ Outcomes	**Some goals Ciena would like to achieve working from with the applicant SME:** 1) Investigate and possibily Develop an AI Framework 2) Develop Deep Learning AI Algorithms 3)Investigate and develop AI/ML algorithms to create a distributed AI pipeline for the edge. 4) Develop the required control loops for RAN, CORE, Transport, and Edge applicationa to create Edge Optimization Solutions. 5) Help to develop the Application Controller and other controllers needed (CORE, Transport, RAN) required for the edge to enable Edge AI optimization. 6) Characterize system requirements for distributed edge AI product(s) 7) Test and Validate AI Framework and AI/ML Distributed AI algorithms in an E2E lab environment. **Proposed timeline:** • Months 1-6 - Review and test initial SW in our lab and start DEMO development;

	• Months 7-12 – Deveolpment of the Edge AI algorithms and Application Controllers • Months 13-18 - Deveolpment of the required Control loops and Edge Optimization Framework • Months 19-24– Final Review & Report, Transfer of Knowledge, and software
Applicant Capabilities	The applciant SME should have the following capabilities related to the development of Artifical Intelligence and Machine Learning: • Comprehensive understanding, and hands-on experience with AI & Machine Learning • Software architecture experience • • Technical background with the ability to understand a wide variety of technologies, standards, and product applications. • Experience with software and complex systems test. • Ability to work in an Agile environment, define sprints, run scrum meetings and drive a rapid demo-based environment - Experience with Java, Python, GoLan, Linux - Understanding of cloud development environments, OpenStack, vmware/Xen - Understanding of networking concepts (IP/MPLS, Ethernet, virtual and physical networks) • Experience with IP, IP routing, IP troubleshooting techniques, congestion management, and ISP network architecture would be a bonus • Data analysis, data modelling, trending/extrapolation • Experience with Analytics Systems including Machine Learning, Hadoop, Cloudera, and Hortonworks • Familiarity with database warehousing principles and database systems • Experience in Understanding of cloud development environments, OpenStack
Additional Information	•

Launched in 2018, the ENCQOR 5G SME Technology Development Program partners Ontario based SMEs with ENCQOR 5G Anchor Firms on 5G technology development projects. Areas of research interest are defined by Challenge Statements submitted to OCE by the ENCQOR 5G Anchor Firms and posted to the OCE website on a rolling basis.

If you are interested in developing an expression of interest, please visit the program guidelines for information on next steps.

For any questions about new Challenge Statements or the ENCQOR 5G SME Technology Development Program please contact Jennifer Moles at Jennifer.Moles@oce-ontario.org.