

Sensor-less Sensing of 5G Application Traffic

Challenge Launch Date	<ul style="list-style-type: none"> December 13, 2018
Challenge Deadline	<ul style="list-style-type: none"> January 24, 2019
Challenge Statement	<ul style="list-style-type: none"> Sensor-less Sensing of 5G Application Traffic. 5G networks are designed to provide an ultra-reliable, high speed communications infrastructure that can serve billions of devices, machines, and vehicles. A transformation from traditional human-based applications (e.g., video and voice) to industrial automation, UAVs, autonomous vehicle (AV) communications, and augmented and virtual reality (AR/VR) based applications is therefore anticipated. However, the underlying characteristics of 5G application traffic requires in-depth investigation and modeling to drive optimization of network architecture and functions across the 5G protocol stack. <p>As such, the challenge of this project is to:</p> <ol style="list-style-type: none"> 1) develop deterministic and artificial intelligence solutions (e.g., deep generative modeling) for various 5G applications using real data-sets, and 2) develop techniques to classify and predict real-time 5G application traffic including short and long-term forecasts, and individual user and aggregate network traffic. The methodologies should require minimal application layer and contextual information and as such be “sensor-less”.
Project Partner	<ul style="list-style-type: none"> Ericsson Canada Inc.
Timeline	<ul style="list-style-type: none"> 2 Years
Available funding	<ul style="list-style-type: none"> 100,000 CAD
Applicant Type	<ul style="list-style-type: none"> Ontario based College/University
Location	<ul style="list-style-type: none"> Work can be completed remotely with scheduled online meetings and face-to-face workshops
Project Details	<ul style="list-style-type: none"> The main scope includes: <ul style="list-style-type: none"> ○ Modeling Traffic of 5G Applications: <ul style="list-style-type: none"> ▪ Creating big data sets of various 5G applications such as AR/VR, Uplink/Downlink data traffic generated from

	<p>Autonomous and Unmanned Aerial Vehicles (UAV), M2M and IoT devices.</p> <ul style="list-style-type: none"> ▪ Developing both deterministic and artificial-intelligence based models for 5G application traffic. ▪ The created models should include time and space dimensions and consider both the individual user and network level traffic. <ul style="list-style-type: none"> ○ Techniques to Classify and Predict Real-time 5G Traffic <ul style="list-style-type: none"> ▪ Develop artificial intelligence (AI) or machine learning (ML) techniques to identify key features of each application type using the real data sets and models. ▪ Develop perception and reasoning techniques to provide real-time data prediction over various time horizons. <ul style="list-style-type: none"> • Strategic importance for the development of the industry and the ENCQOR consortium: <ul style="list-style-type: none"> ○ The challenge targets a largely unexplored area of classifying and predicting future 5G application which is paramount to optimizing 5G network architecture and protocols. ○ Builds a strong competence in artificial intelligence and machine learning for real world applications among Canadian early stage researchers.
<p>Project Goals/ Outcomes</p>	<ul style="list-style-type: none"> • Big data set of traffic patterns generated from 5G applications such as VR/AR, UL/DL traffic from autonomous vehicles, industrial automation and IoT devices. • Mathematical and generative AI models (e.g., deep generative models) that represent patterns of 5G traffic applications. • ML/AI-based techniques for real-time classification of 5G network traffic, and predictive models the can forecast traffic over various time horizons. <p>Deliverables:</p> <ul style="list-style-type: none"> • Stored and preprocessed big datasets containing 5G traffic streams for various applications. • Derivations of the mathematical models for 5G application traffic. • Supervised/unsupervised trained machine learning/AI models that classify 5G traffic and extract the key features of different applications. <ul style="list-style-type: none"> ○ All the models should be developed using open source ML/AI suites (e.g., Python and R libraries). • A detailed assessment of the developed algorithms and their accuracy under various user traffic combinations. •
<p>Applicant Capabilities</p>	<ul style="list-style-type: none"> • 2 researchers (M.Sc. or Ph.D. level) • Strong background in statistics, machine learning, data analytics, linear/non-linear optimization and artificial intelligence. • Experienced in application traffic modeling.

Additional Information	<ul style="list-style-type: none"><li data-bbox="574 233 667 268">• N/A