

Anchor Firm	
Challenge Statement	mmW Vision-Assisted Beam Management

Challenge Launch Date	April 8, 2020
Challenge Deadline	May 13, 2020
Challenge Statement	<p>Beam forming in MIMO systems can rely on codebook-based approach or can estimate the ideal beam based on received Uplink signals. Optimization of Downlink often relies on accurate estimation of channel conditions for reciprocity-based systems, or user equipment (UE) response of the beam index with the highest SNR in High-band (HB) beam forming system. As the number of antennas increases (especially in HB Radios), tracking UE movement will add complexity, overhead and latency.</p> <p>Ericsson is interested in working with an Ontario based SME company to conceptualize, design and test a low latency video analytics module to complement traditional beam management algorithms in 4G and 5G cellular networks.</p> <p>The end solution will leverage ultra low latency edge video analytics/ai to feed Ericsson baseband scheduler decisions in the context of beam forming and steering.</p>
Project Partner	Ericsson Canada Inc. 349 Terry Fox Drive, Kanata, Ontario.
Timeline	<p>Up to 18 months [NOTE: Projects must be completed by March 31, 2022, no extensions will be available beyond this timeline]. The project is to be completed in a phased approach.</p> <p>Phase1: 6 months for Proof of Concept Phase2: Up to 12 months for solution prototype</p> <ul style="list-style-type: none"> - Prototype a system that performs low latency video analytics that can augment an Advanced Antenna System (AAS) Radio in a 4G or 5G cellular network base station. - Work with Ericsson beam management experts to define an interface for data transfer between the proposed system and the AAS radio of the cellular base station. - Support Ericsson during the integration and testing phase, at Ericsson’s Terry Fox lab and prototype solutions to confirm overall performance. - Propose a path to industrializing the technology.

	<ul style="list-style-type: none"> - Deliver a working prototype and a final report for the solution.
Available funding	Up to \$300,000 CDN
Applicant Type	Ontario based SME Scale company
Location	<p>Ontario [NOTE: live demonstrations in Kanata are required every quarter], as well as bi-weekly conference calls</p> <p>NOTE: Some testing of prototyped solutions is to be completed at Ericsson’s Terry Fox Lab, Kanata, ON.</p> <p>It is expected that the SME will perform most of the work at their site, or home offices, and have appropriate tools and software necessary to conduct this work.</p>
Project Details	<p>Proof of Concept</p> <ul style="list-style-type: none"> - Develop a Proof of Concept that uses a camera to identify, map and predict (in the short term) the movement of objects in a given field of view, operating under various weather and lighting conditions. These movements and predictions are sent to a “remote” server. The information exchange between camera and server should be sub 20ms. With the understanding that the end goal of the solution is an exchange on the order of a few MS Google’s Coral Dev board or similar may be a good starting point for prototyping. <p>Solution Prototype</p> <ul style="list-style-type: none"> - The final solution envisioned is a system where a camera is co-located with an Ericsson Massive MIMO radio, processes video in real-time and is able to send relevant information to the Ericsson baseband within a few milliseconds, enabling the Ericsson radio to make scheduling decisions based on visual information. - Once Proof of Concept complete, identify work items to reduce latency to identified requirements from Ericsson. Work with Ericsson to the Refine Data Model and Interface to migrate from information exchange with a generic server to Integration with Ericsson Baseband. Work with Ericsson to identify a few use cases in which such a system would be advantageous compared to traditional beam management algorithms, and list potential gains. - Work with Ericsson through integration and outdoor testing scenarios to refine solution as necessary. To be defined by Ericsson based on results. Expected not to last longer than 4 months. - The ML Libraries used for inference and overall Software infrastructure shall be remotely upgradable.

<p>Project Goals/ Outcomes</p>	<p>Outcomes</p> <ul style="list-style-type: none"> - Deliver a solution prototype that proves that vision assisted beam forming has advantages over traditional methods - Deliver all reports, data, and lessons learned in achieving the above - Depending on the level of success of the solution prototype, the end goal would be to establish a new product line of vision assisted mm-wave based radio systems.
<p>Applicant Capabilities</p>	<p>The SME must have:</p> <ul style="list-style-type: none"> - extensive expertise in Video Analytics/AI and Edge Computing. - an understanding in 5G, Wireless Communications and beam steering in mm-wave systems. These competencies could already be in-house or brought in via consultants/3rd party. Note any 3rd party will need to be approved by Ericsson. - own simulation tools and capability and be able to operate with minimum supervision.