ENCQOR 5G **Technology Development Program [SME Stream]**

Anchor Firm	THALES
Challenge Statement	**5G ORAN and MEC for Mass Rail Transit System Use case**

Challenge Launch Date	October 14, 2020
Challenge Deadline	November 11, 2020
Challenge Statement	The public transportation industry serves a larger public interest, delivering numerous benefits to society. One benefit is the output of lower carbon emissions which improves and promote healthier urban space. Efficiency of public transportation has a direct impact on economies of cities. Smart Cities initiatives must include solution for Mass Transit systems. Mass Transit Operators face the following problems in the current environment to effectively achieve operational efficiencies: - Ensure passenger safety and security; - Provide better and more intelligent remote management and monitoring [e.g. preventive maintenance]; - Provide travel comfort improvements; and, - Support applications within Metropolitan Transportation Authority [MTA]. One of the critical elements to accomplish these efficiencies require implementation into the 5G Network environment. Mobile Network Operator [MNO's], Industrial vendors, and verticals are working together to define the open base standards that will help evolve 5G networks support new services and applications. For all these reasons Thales URS considers ORAN 5G as a potentially very important and necessary critical component of the future CBTC (communication based and control) systems and solutions. The project that we are proposing under ENCQOR program is actual design of the fully operational 5G ORAN test bed that will be installed in the Thales Toronto facility where further detail testing of the CBTC performance over this Test Bed can be performed. Test Bed implementation will allow OTA testing (over the air testing) with selected set of the 5G devices. Some of the 5G devices that will be provided will come from Thales URS. In addition, Test Bed should allow

	future expansion of the capability with MEC (multiservice edge computing). Project shall maximize content from the Canadian companies that are already becoming prominent players and solution providers in 5G ORAN ecosystem. This project offers potential long-term economic benefits to: 1. Thales URS will be able to incorporate 5G ORAN solution in our overall CBTC solution enhancing our competitiveness, ability to address existing and future customer requirements 2. SME will have opportunity to develop additional necessary skills related to design of the ORANN 5G Network, its installation, configuration, and management enhancing their future competitiveness. 3. SME's will develop relationships with Thales that will enable their future involvement in Thales projects related to 5G ORAN implementations for our MTA customers. 4. Canadian companies currently providing ORAN 5G components will also have opportunity to participate and further enhance their solutions for specific Urban Railway use case.
Timeline	- up to 9 months [NOTE: Projects must be completed by March 31, 2022, no extensions will be available beyond this timeline].
Available funding	- Up to $480,000 CDN
Applicant Type	Ontario based SME Scale company
Location	Ontario
Project Details	Project should demonstrate capabilities of Open Radio Access Network [ORAN] 5G Architecture for mass railway transit. ORAN is one of the central standardization efforts in that regard. Combining benefits of the artificial intelligence [AI] and machine learning [ML] applied to the Open RAN will create many benefits. These include improved network performance; accelerated time-to market of new services and functions; more flexible and agile networks; and CAPEX and OPEX efficiencies. The O-RAN specification complements 3GPP, ONAP and ETSI specifications. Open RAN aims to create easier interoperability on existing 3GPP RAN interfaces. In addition, the O-RAN Alliance is defining new interfaces not currently being specified by 3GPP. Project shall include the following: 1. Develop architectural study and design document that will outline trade-off analysis of different possible ORAN splits applicable to typical Urban Railway Use case scenario. Thales URS team shall define details of the typical Urban Railway deployment.

	2. Demonstrate procurement, installation and integration activity of all ORAN elements acquiring COTS HW components form the vendors that are part of the ORAN ecosystem, including COTS x86 based HW platforms required for installation of the 5G core functions as well as BBU/CU and DU units. 3. Identify, procure, and install RRU units 4. Select SW vendors that are providing individual 5G OARN building blocks, UP, SMF, AMF, CU, and DU protocol stack. 5. Procure at least two 5G capable UE devices that will be used for demonstration and testing of the over the air 5G connectivity. 6. Integrate all 5G ORAN components into operational Test Bed 7. Complete over the air testing [OTA]of the Test Bed build out at the Thales site. [Frequency band of operation for the test bed will be determined at the later stage].
Project Goals/ Outcomes	Project goals will be to demonstrate: 1. Install CBTC Operation over 5G ORAN Test bed in Thales Toronto System Integration Lab [SIP]; 2. Design benefits of the 5G ORAN architecture to Urban Railway use case; 3. Develop a cost Analysis CAPEX and OPEX considering typical Urban Railway deployment; and, 4. Define the long-term benefits related to product longevity, maintainability, obsolescence issues.
Applicant Capabilities	• Engineering team capable of demonstrating end to end understanding of 5G ORAN ecosystem, core components; • Strong background in RAN System Integration, Virtualization; • Familiarity with 5G and MEC concept, MTC, M2M, IoT; and, • Experienced in deployment of VM, container and docker technologies.