



# Technology Development Program [SME Stream]

Anchor Firm	
Challenge Statement	Massive telemetry and analytics project

Challenge Launch Date	June 19, 2020
Deadline for Open Call Applications	July 17, 2020
Challenge Statement	<p>Adaptive, programmable communication infrastructure is one that can be accessed and configured via common open interfaces and can adjust its resources as needed to meet the demands of the applications running on top of it. Decisions cannot be made without collecting vast amounts of telemetry data from a variety of sources, covering devices that comprise sensors, connect, compute and store infrastructure, and applications that are enabled by this infrastructure.</p> <p>The massive telemetry and analytics project aims to refine and demonstrate approaches that allow an efficient collection of massive amounts of infrastructure and application level data points (events), parsing and preprocessing information using compute resources commensurate with network edge deployments. This data ingestion/filtering mechanism should enable optimized machine learning algorithms to provide actionable insights to human operators and to implement automated, adaptive operational improvements, security/threat remediation, etc.</p>
Project Partner	Ciena Canada
Timeline	Up to 18 months [ NOTE: Projects must be completed by March 31, 2022, no extensions will be available beyond this timeline].
Available funding	Up to \$500,000.00 CDN
Applicant Type	Ontario based SME (Small-Medium Enterprise)
Location	Ontario
Project Details	<p><b>Programmable Infrastructure</b> Adaptive, Programmable infrastructure is one that can be accessed and configured via common open interfaces and can adjust its resources as needed to meet the demands of the applications running on top of it. A programmable network delivers connectivity for the Adaptive Networks vision, with additional functions provided by a variety of sensors, compute and storage devices.</p> <p><b>Telemetry</b> Quality and accessibility of telemetry information from both devices and applications is key in enabling the Adaptive Network vision. Equipment and applications will be highly instrumented, with the ability to export real-time measurement and event data which may be written directly into storage data lake or made accessible through standards-based APIs.</p> <p><b>Analytics &amp; Intelligence</b> Collecting network performance data, and analyzing this data using machine learning and Artificial Intelligence (AI), provides the ability to more accurately predict potential network problems and anticipate trends by turning mountains of data into actionable insights. Leveraging these insights can help network operators develop smarter, data-driven business policies that enable them to adapt to customer needs securely, and in real time.</p>

### Intent-based Policy

Policies are the 'road-rules' for how an Adaptive Network will behave. Intent-based behavior means the network can adapt to changing network, service or application conditions within the bounds of the policy framework.

### Automation & Orchestration

Multi-Domain Service Orchestration (MDSO), federated inventory, and centralized, software-defined control of individual domains form the basis of adaptive networking. The adoption of a unified telemetry and mediation layer between the underlying infrastructure and OSS/BSS overlay means networks can evolve while minimizing disruption and cost to IT. The mediation layer is seen as a key enabler for multi-vendor and open options.

### Closing the loop

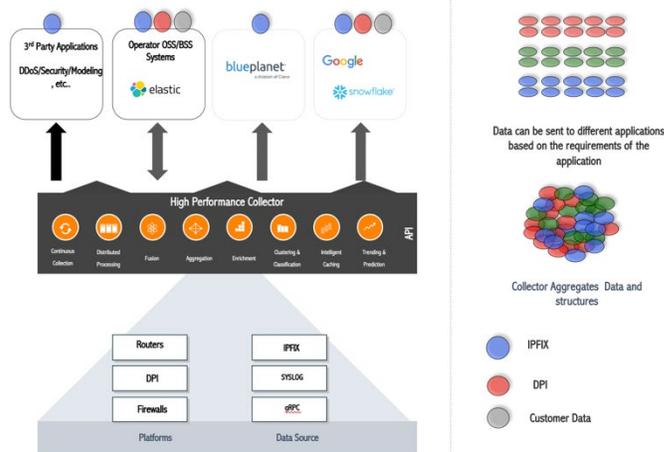
The building blocks for an Adaptive Network are:

- a programmable sense, connect, compute and store infrastructure
- rich telemetry information from the infrastructure
- intent-based policy framework
- analytics, Machine-learning and AI
- control and automation for closed loop optimization

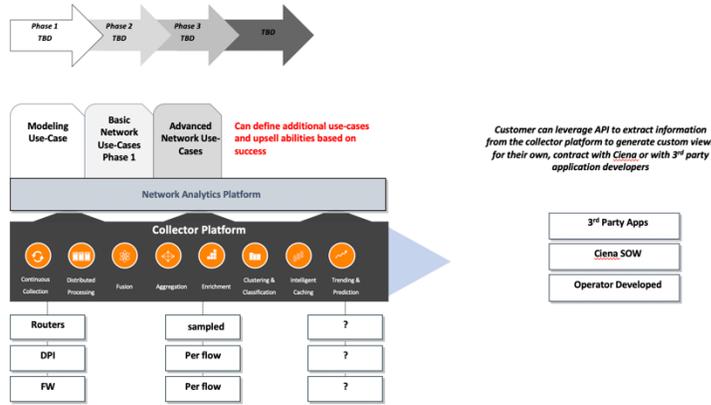
With the above build blocks in place, operators can 'close the loop' using an open choice of software components to form infrastructure which is agile, adaptive to changing needs, and cost optimized.

The following diagrams illustrate some of the concepts described in preceding.

Simple & Flexible Deployment Models



## Framework For Analytics Solution



### Project Goals/ Outcomes

This project has 3 key objectives:

1. Develop and demonstrate a method to ingest massive amounts of telemetry data from a variety of hardware and software platforms, including Ciena's.
2. Produce a functional implementation that can be demonstrated at scale
3. Develop 3 leading application uses cases to enable Adaptive Network

Some example front-end use cases – focus on leveraging ingestion/parsing engine

- Develop a user-interface to facilitate operator defined selection of ingestion parameters and events, user-driven correlation of events from disparate sources for data reduction and deduplication. Develop a north-bound interface to pass the correlated and deduplicated meta-data to higher layer analysis and action layers.
- Ingest meta-data from above and provide a user interface dashboard to allow easy data visualization with high-level and drill-down detail capabilities. Platform should allow the user to set over-indexing alerts that would trigger near-real time actions.
- Feed Ciena hardware events (syslog, SNMP, etc.) into the engine and have it parse the flows and monitor for anomalies. In my mind these are security anomalies but could just as easily be operational events (processor spike, fan speeds, heat, etc.)
- Monitor NFV solutions running at the edge and look for anomalies – this would augment our NFVI solution with a custom On-Edge security engine

Some example middle-end use cases – this is where the flows have already been processed and Ciena is augmenting in house or other 3<sup>rd</sup> party services

- Use SME-provided ML engines to demonstrate failure detection, proactive/predictive capabilities, etc.
- Depending on Ciena's internal resource availability, integrate Ciena ML/AI team work to enhance performance of the failure detection and predictive analytics.
- Use ML outputs to monitor for IOT anomaly detection. There are uses where it is needed to process and monitor for say smart city devices that are behaving poorly at the edge and transport the traffic to the core for processing is not wanted.
- Could the 5G controllers be integrated. Potentially monitor 5G slices, look for over utilization, controller manipulation or jumping of slices to a protected use case (say a 1<sup>st</sup> responder slice)

ENCQOR program provides access to a variety of hardware that may serve as sources for sample telemetry data. Further, Ciena provides access to Ciena

	<p>Emulation Cloud as a source of telemetry data and events.  <a href="https://media.ciena.com/documents/Emulation_Cloud_DS.pdf">https://media.ciena.com/documents/Emulation_Cloud_DS.pdf</a>  <a href="https://ontario.encgor.ca/accessing-5g-innovation-platform-as-a-service-ipaaS-testbed/">https://ontario.encgor.ca/accessing-5g-innovation-platform-as-a-service-ipaaS-testbed/</a></p> <p>The actual deliverables will consist of:</p> <ul style="list-style-type: none"> <li>- Project plans and budgeting</li> <li>- Architecture and requirements analysis</li> <li>- Design, implementation, integration of the SME’s technology and new artifacts with Ciena’s hardware and software platforms</li> <li>- Data and test results to validate functionality and performance</li> </ul> <p>Ciena plans to be involved in leveraging its technology and expertise. As such, the applicant will be required to develop a plan for the ownership of this intellectual property with Ciena.</p>
<p><b>Applicant Capabilities</b></p>	<p>Companies with products, technologies or services in the following areas are encouraged to submit an application:</p> <ul style="list-style-type: none"> <li>- Telemetry acquisition platforms and/or expertise</li> <li>- Analytics and ML expertise in processing massive data scales</li> <li>- Containerized application development and management</li> <li>- Cloud-native application development and management</li> <li>- Telecom network management software, OSS, field operations tools</li> <li>- Experience with the telecommunications industry, carrier networks operations, network technologies and API design with an emphasis on Software Defined Networks.</li> <li>- Network modeling, visualization, design and engineering</li> </ul>