

Fine Grain Placement Service (F-GPS) Edge Automation (Dublin)

- Analytics as a Service Closer to Edges
 - Problem Statement:
 - Dublin Requirements Summary: Distributed Analytics as a Service (Dublin Summary) - Edge Automation
 - Architecture Scope:
 - ONAP-based Analytics as a Service Details: (see Distributed_analytics_v3.pptx in Edge Automation through ONAP)
 - Fine Grained Placement Service (F-GPS)
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Analytics as a Service Closer to Edges

Problem Statement:

- **The goal of Analytics as a Service closer to edges is address edge Scalability, Constrained Environment and Service Assurance Requirements.**
 - Avoid sending large amount of data to ONAP-Central for training, by letting training happen near the data source (Cloud-regions).
 - ONAP scale-out performance, by distributing some functions out of ONAP-Central such as Analytics
 - Letting inferencing happen closer to the edges/cloud-regions for future closed loop operations, thereby reducing the latency for closed loop.
- Reference: [ONAP-edge-automation-update-arch-use-case-10-23-2018.pdf](#)
- **5G use case relevance**
 - **5G/performance Analysis and Optimization:** High Volume and RT Data Collection/Analytics/Closed Loop of performance metrics at the Edge Cloud
 - Reference: [ONAP-edge-automation-update-arch-10-29-2018-followup-11-07-2018.pptx](#)
 - Reference: [5G_UseCase_for_Dublin_v4.pptx](#) (reference slide adapted from this deck)



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Dublin Requirements Summary: [Distributed Analytics as a Service \(Dublin Summary\) - Edge Automation](#)

Architecture Scope:

- Instantiation of edge and connectivity to ONAP central (out of scope for ONAP)
- Edge Cloud Registration [Ref. Arch. Impact Details (1)]
 - Automation of registration when scale (>100s)
- ONAP edge functions or 3rd party edge functions deployed at edge (e.g. Analytics, Closed Loop Control) [Ref. Arch. Impact Details (21 , 22)]
 - Registration of the edge functions to ONAP central (Intent, capabilities, capacity)
 - Intent Example: "Infrastructure Analytics as service for Alerts at Cluster Level and Host Level"
- Deploy Network Services in an optimal way to the edges using edge/central functions [Ref. Arch. Impact Details (3)]
 - Includes multiple VNFs on multiple edges/core which make a service
 - Cloud region (means one control plane) choice
 - Connect the service to the functions
- Networking of ONAP Central and edge functions [[Ref. Arch. Impact Details \(5\)](#)]

Reference: [ONAP-edge-automation-update-arch-10-29-2018-followup-11-07-2018.pptx](#)

[ONAPARC-280](#) - Getting issue details...

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[ONAPARC-317](#) - Getting issue details...

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ONAP-based Analytics as a Service Details: (see [Distributed_analytics_v3.pptx](#) in [Edge Automation through ONAP](#))



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- What does ONAP-based Analytics Service encompass?
 - Support analytics-as-a-service in the cloud-regions that have K8S site orchestrator.
 - Use same analytics framework to have analytics even in ONAP-Central.
 - Two packages - Standard package and inferencing package.
 - Use existing analytics applications - TCA to prove this framework.
 - As a stretch - Showcase one ML based applications
 - Training application
 - Inferencing application
- How to Develop?
 - Use PNDA as a base
 - Create/adapt Helm charts
 - Ensure that no HEAT based deployment is necessary.
 - Use components that are needed for normal analytics as well ML based analytics (Apache Spark latest stable release, HDFS, OpenTSDB, Kafka, Avro schema etc..)
 - Use some PNDA specific packages - Deployment manager as one example.
 - Develop new software components
 - that allow distribution of analytics applications to various analytics instances
 - that allow onboarding new analytics applications and models.
 - that integrates with CLAMP framework (if needed)
- Impacted ONAP Projects
 - DCAE, CLAMP, A&AI (TBD), Multi-VIM/Cloud (TBD)
- How to Test?
 - TCA (Changes - Convert this as a spark application)
 - New Machine learning models for KPI (packet loss) prediction (New use case)

3rd Party Analytics Application - Dublin Scope

- Register VMware VIO (OpenStack-based) edge cloud region(s) in ONAP Central (Note: These Edge Cloud Regions support K8S)
 - References:
 - <https://docs.vmware.com/en/VMware-vCloud-NFV-OpenStack-Edition/3.0/rn/vCloud-NFV-OpenStack-Edition-30-Release-Notes.html>
 - <https://docs.vmware.com/en/VMware-Integrated-OpenStack/5.0/rn/VMware-Integrated-OpenStack-50-Release-Notes.html>
 - **ONAP project impact:** None
- Deploy VMware vROps 3rd party infra analytics framework/application in target edge cloud region to monitor multiple edge cloud regions
 - References:
 - <https://docs.vmware.com/en/VMware-vCloud-NFV-OpenStack-Edition/3.0/rn/vCloud-NFV-OpenStack-Edition-30-Release-Notes.html>
 - <https://docs.vmware.com/en/vRealize-Operations-Manager/6.7/vrealize-operations-manager-67-reference-architecture-guide.pdf>
 - In vrops reference architecture this is known as multiple data centers with remote collectors.
 - **ONAP project impact:** None
 - Note: 3rd party infra analytics application configuration is out of scope for Dublin
- Deploy microservice in target edge cloud region for cloud infra Event/Alert/Alarm/Fault Normalization & Dispatching to ONAP Central
 - Note: This microservice uses the Multi-VIM/Cloud project repository for development
 - ONAP project impact:
 - **Multi Cloud project impact**
 - Cloud infra Event/Alert/Alarm/Fault Normalization & Dispatching microservice development
 - Integrate DMaaP (Kafka) client for communication to ONAP Central
 - Receive Event/Alert/Alarm/Fault from 3rd party infra analytics application
 - Normalize from cloud specific Event/Alert/Alarm/Fault format to cloud agnostic (ONAP internal) Event/Alert /Alarm/Fault format
 - ONAP internal format references
 - [Control Loop Design](#)
 - Questions: Does each control loop need a separate policy component?
 - Alert examples (Note: Host CPU Threshold & Memory Contention Threshold in a cloud region are defined separately)
 - Exemplary Alert Definition:
 - Standalone host has memory contention due to overpopulation of virtual machines.
 - Symptoms include the following:
 - Host memory workload at warning/immediate/critical level
 - Host memory contention at warning/immediate/critical level
 - > 50% of child virtual machines have Virtual machine memory workload at warning /immediate/critical level
 - Exemplary Alert Action:
 - Scale out VNF
 - ...
 - [References:](#)
 - <https://docs.vmware.com/en/vRealize-Operations-Manager/6.6/vrealize-operations-manager-66-reference-guide.pdf>
 - Dispatch Event/Alert/Alarm/Fault to ONAP central using DMaaP (Kafka) client
 - Cloud infra Event/Alert/Alarm/Fault Normalization & Dispatching microservice deployment
 - Develop K8S Helm chart
 - **Note:**

- **This microservice is focussed on operational workflow & and independent of the current deployment focused microservices in multi vim/cloud.**
- Register 3rd party infra analytics application in ONAP Central (Stretch Goal)
 - ONAP project impact:
 - **Multi Cloud impact - Below**
 - Populate Intent in A&AI
 - Infra Analytics as service exemplary intent -- "Infrastructure Analytics as service for Alerts at Cluster Level and Host Level for a Cloud Region"
 - Capabilities (not exhaustive) corresponding to intent in A&AI (Note: Cluster CPU Threshold & Memory Threshold are defined separately)
 - Cluster has memory contention caused by more than half of the virtual machines
 - Cluster has memory contention caused by less than half of the virtual machines
 - Cluster has unexpected high CPU workload
 - ...
 - Populate Cloud Region List in A&AI corresponding to Intent
 - **A&AI:** Leverage existing HPA/Intent key-value pair schema

Fine Grained Placement Service (F-GPS)



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