



OAM Operation

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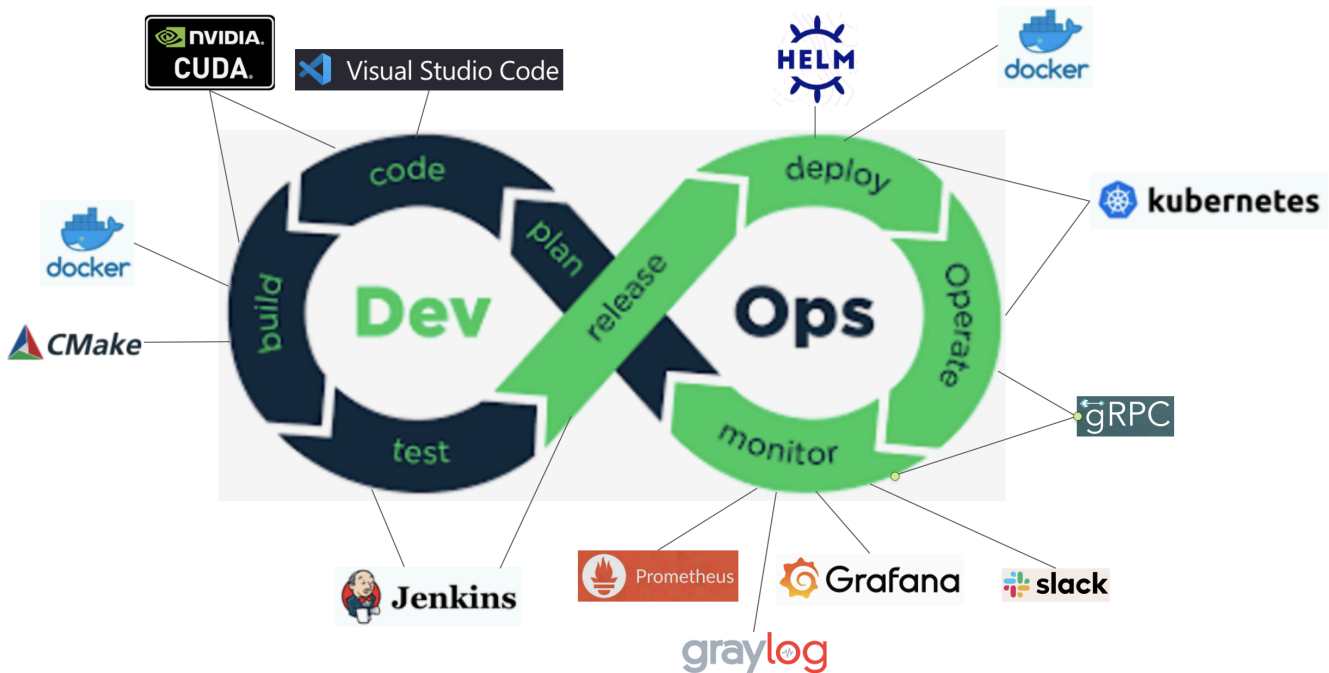
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Cloud Native DevOps

Aerial CUDA-Accelerated RAN is based on cloud-native principles and supports a DevOps work-flow using industry standard tools such as Kubernetes, gRPC, and Prometheus.



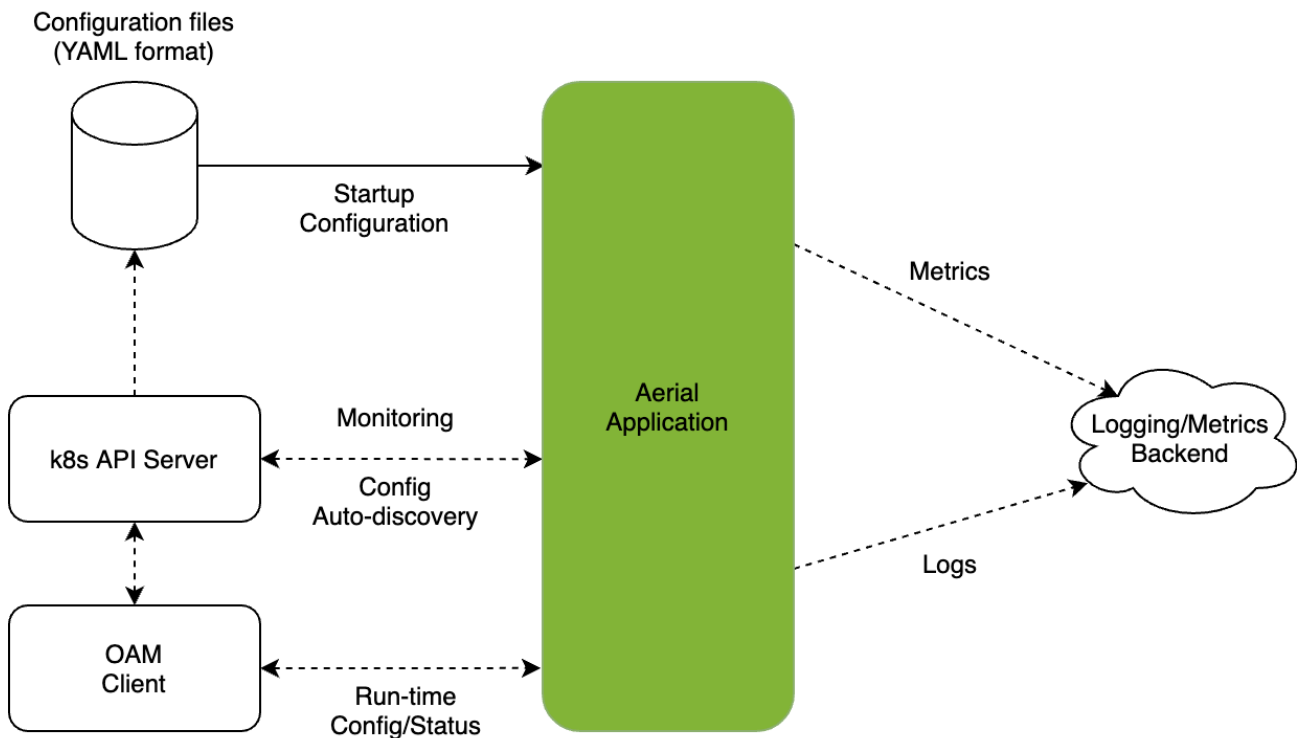
Aerial Applications

The Aerial framework includes three primary applications for end to end L1 implementation and testing.

- **cuphycontroller** is the full L1 stack application. This application implements the adaptation layer from L2 to the cuPHY API, orchestrates the cuPHY API scheduling, and sends/receives ORAN compliant Fronthaul traffic over the NIC. Several independently configurable adaptation layers from L2 to the cuPHY API are available.
- **test_mac** application, for integration testing, implements a mock L2 that is capable of interfacing with cuphycontroller over the L2/L1 API.
- **ru-emulator** application, for integration testing, implements a mock O-RU + UE that is capable of interfacing with cuphycontroller over the ORAN compliant Fronthaul interface.

Every Aerial application supports the following:

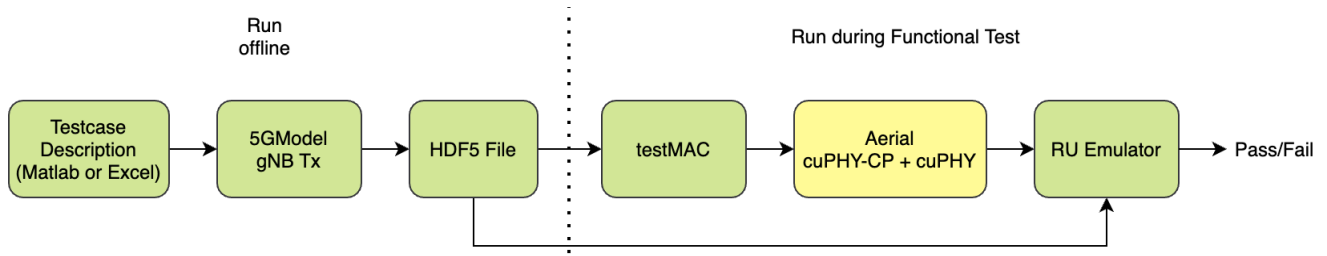
- Configuration at startup through the use of YAML-format configuration files.
- Support for optionally-configured cloud-based logging and metrics backends.
- Support for optionally-deployed OAM clients for run-time configuration and status queries.
- When deployed as a Kubernetes pod:
 - Support for application monitoring and configuration auto-discovery through the Kubernetes API.
 - Configuration YAML files can optionally be mounted as a Kubernetes ConfigMap, separating the container image from the configuration.
 - Configuration YAML files can optionally be templated using the Kubernetes kustomization.yaml format,



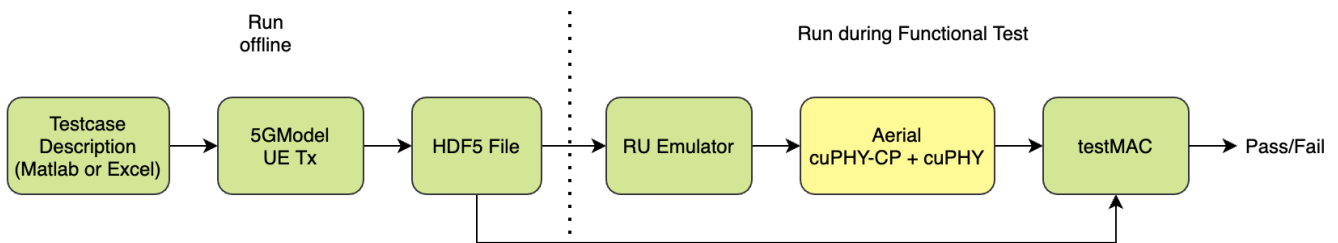
Deployment Scenarios

Functional Testing

For real-time functional correctness testing, test cases are generated offline in HDF5 binary file format, then played back in real-time through the testMAC and RU Emulator applications. The Aerial cuPHY-CP + cuPHY components under test, run in real-time to exercise GPU and Fronthaul Network interfaces. Test case sequencing is enabled through configurable launch pattern files read by testMAC and RU Emulator. The diagram below shows an example of downlink functional testing:

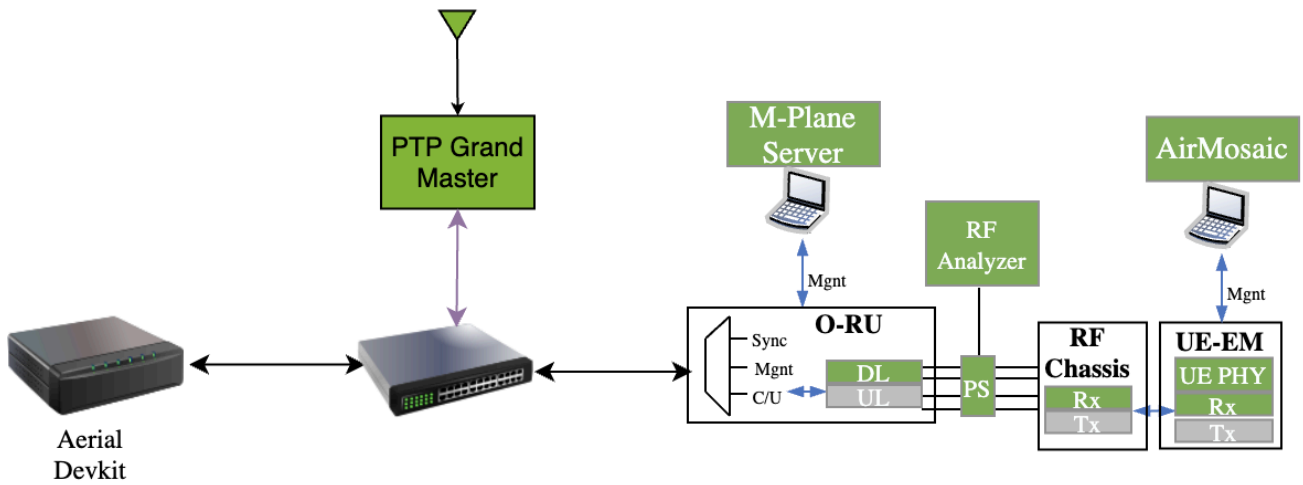


The diagram below shows an example of uplink functional testing:

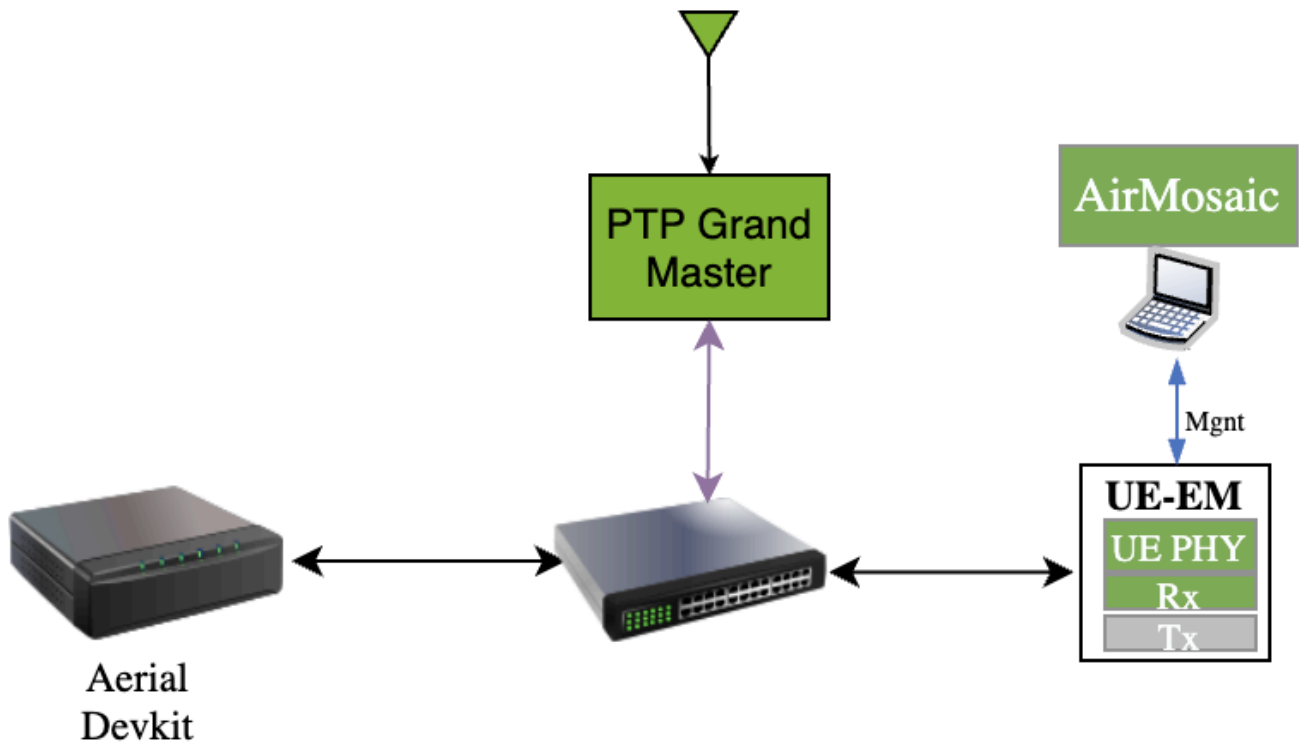


End to End Testing

A variety of end to end testing scenarios are possible. Shown below is one example using an Aerial Devkit implementing the CU+DU, an ORAN compliant RU connected to the DU via the ORAN fronthaul interface, and UE test equipment from Keysight.



Another example is the all-digital eCPRI topology is shown below with an Aerial Devkit implementing the CU+DU with the Keysight test equipment implementing the O-RU and UE functions.



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