Contributors:

Supporting Companies:

- Amdocs
- AT&T
- China Mobile
- Ciena
- Cisco
- Ericsson
- Huawei
- Intel
- Nokia
- Viavi
- VMware
- And Others
5G Network Architecture & Casablanca Scope

RU – Remote Radio Unit
CU-UP – Centralized User Plane
UPF – User Plane Function
UDM – Unified Data Management Function

DU – Distributed Unit (5G Base Unit)
CU-CP – Centralized Control Plane
SMF – Session Management Function
AUSF – Authentication Service Function

Casablanca Scope

Front Haul
Mid Haul
Edge Cloud
Back Haul

Disaggregated Core

UPF
SMF
UDM
AUSF

5G Application Ecosystem
Macro Radio & Small Cell Antennas

UE/CPE - Remote Radio Unit
RU – Distributed Unit (5G Base Unit)
CU-CP – Centralized Control Plane
UPF – User Plane Function
SMF – Session Management Function
UDM – Unified Data Management Function
AUSF – Authentication Service Function

THE LINUX FOUNDATION
**Casablanca Enhancement Summary:**

- Enhance ONAP Platform to deploy hybrid 5G Radio Network (PNFs & VNFs)
  - Expand Packaging standards to include PNFs
  - Enhance VNFDSK to support PNF packages as well (depends on 1)
  - Enhance SDC to support PNF onboarding and hybrid network design (using PNF / VNF)
  - Need a way to model in SDC the “Service Instantiation” sequencing relationships that SO must enforce for PNF service instantiation.
  - Add PNF Plug-n-Play to auto register newly installed PNF
  - Enhance SO to support decomposition of Services that include VNFs and PNFs
  - Support for Edge deployment (e.g. CUs) – Edge Cloud Automation
  - Expand ONAP controllers by adding wireless service yang models, network yang models and service logic to ONAP.
  - Add common reusable logic to CCSDK to support wireless
  - Support a single controller persona to support L1-7 network configuration and lifecycle management for 5G network elements
  - Integrated controller configuration design tool to capture L1-7 configuration data for radio network elements
  - Enhance DCAE for near real-time (order of seconds) streaming performance data collection
  - Enhance DCAE for Bulk performance data collection
  - Introduce Real-time streaming analytic platform

- OOF enhancements for optimal placement of edge resources & Framework Enhancements to implement selected network optimization (e.g. PCI assignment)
# PNF PnP Enhancements

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td><strong>PNF Registration Handler (PRH) enhancements</strong></td>
<td>Define a New VES Event Domain for PNF registration with the corresponding support in DCAE VES Collector, DMaaP and PRH</td>
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<tr>
<td><strong>SDC Enhancements</strong></td>
<td>Enhance SDC to support PNF onboarding and hybrid network design (using PNF / VNF) with generic workflow to instantiate PNF (i.e. put it in service)</td>
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<td><strong>SO Workflow enhancements</strong></td>
<td>Enhance SO to support model driven dedicated workflow for PNF elements</td>
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<td><strong>Service Configuration Enhancements</strong></td>
<td>Add needed artifacts in CCSDK to support Radio / Microwave configuration, PNF discovery and registration support</td>
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<td><strong>Security enhancements</strong></td>
<td>Authentication and Certificate support for PNF, including registration event and data collection (fault and performance)</td>
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<tr>
<td><strong>Modeling enhancements</strong></td>
<td>Enhance ONAP information and data model to fully support 5G PNF elements, including inheritance and PNF sharing characteristic</td>
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<tr>
<td><strong>PNF onboarding and packaging</strong></td>
<td>Define PNF Package, PNF package validation and onboarding enhancements</td>
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## Service Configuration Enhancements

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<tr>
<td><strong>Enhance CDT tool to support 5G and integrate into SDC</strong></td>
<td>Integrate App-C focused CDT tool into SDC and enhance it to support 5G network elements and integrate with L1-7 GNFC</td>
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<tr>
<td><strong>Capture and Verify PNF Software version</strong></td>
<td>Enhance GNFC to capture and verify PNF software version, Enhance A&amp;AI to store PNF Software version</td>
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<tr>
<td><strong>PNF &amp; CU Application Level Configuration</strong></td>
<td>Generate a single ONAP controller persona from CCSDK (called GNFC) to support various 5G network elements (Layer 1 through 7 configuration and management)</td>
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<td><strong>Lifecycle management Support</strong></td>
<td>Enhance change management and Close Loop Automation (CLAMP) to support 5G PNF / VNFs</td>
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## Performance Analysis & Optimization

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<tr>
<td><strong>Bulk performance measurement (PM) data collection</strong></td>
<td>Enhance DCAE VES collection layer to support periodic (e.g. every 5 to 15 minutes) bulk data collection from VNFs and PNFs. Support both file-based collection and mapping to VES Events for chosen file content</td>
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<tr>
<td><strong>High Volume and Near Real-time streamed data collection of Performance measurements</strong></td>
<td>Enhance DCAE performance measurement (PM) data collection to support near real-time (order of seconds) data. Introduce a high-volume VES collector using a persistent connection (TCP socket), support a new data encoding (GPB). Distribute DCAE collection at the cloud edge (for scalability)</td>
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**Optimization Framework Enhancements**

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<tr>
<td><strong>Optimal placement of vNF</strong></td>
<td>Placement of Mobility Virtual Network Elements (CUs) across the highly distributed edge clouds is a fundamental requirement. Service Providers must also optimize the performance of the 5G RAN in real-time.</td>
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<td><strong>Optimization problem formulation</strong></td>
<td>Ability to model the problem as a constrained optimization problem, that is driven by policies – Potential use case examples: formulation of optimization problems at various levels: Customer (e.g. provisioning), Service (e.g. slice optimization), Network (e.g. Routing, problems at the network planning level), Infrastructure (e.g. Placement) &amp; Resource (e.g. License)</td>
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<tr>
<td><strong>Optimization problem solving</strong></td>
<td>Ability to use and deploy appropriate analytics, algorithms and solvers to solve the problem in acceptable time frames at various levels: Customer, Service (e.g. Slice Optimization Analytics), Network (e.g. SON network planning analytics), Infrastructure (e.g. Placement) &amp; Resource</td>
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Thank You!