

# 5G RAN Deployment (A) - Casablanca

Input to Team Discussion

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# 5G RAN Deployment (A) Description

Objectives and description from 5G UC presentation for Casablanca

## High Level Objectives

Deployment of the hybrid 5G Radio Network (PNFs & VNFs)

- Complete PNF Support
- Platform Enhancements to Deploy Edge Virtual Radio Network Functions (e.g. CU)

## Description

Disaggregated 5G RAN may include PNFs and VNFs, in which case cloud infrastructure deployment at the edge is required. Beijing implemented the first phase of PNF discovery and instantiation. Our goal for Casablanca is expand on that work, include VNF deployment at the edge, and fully integrated lifecycle management. Key enhancements needed are:

- Support full Application level Configuration (+Ansible), allow various mobile network elements to be controlled from same controller persona created from CC-SDK
- Add Lifecycle management functions to controller persona
- Support an integrated configuration design tool in SDC that can be used with any controller persona (next gen CDT)
- Add support for PNF Software Management and Change management
- Edge Cloud Support
- Add needed support for deploying Mobility Virtual Network Elements (e.g. CU) at the Edge locations
- Further automation of PnP Discovery for PNF

# RAN Lifecycle Overview (ONAP-centric)

Both design and run-time activities



Separate workgroup started for EC

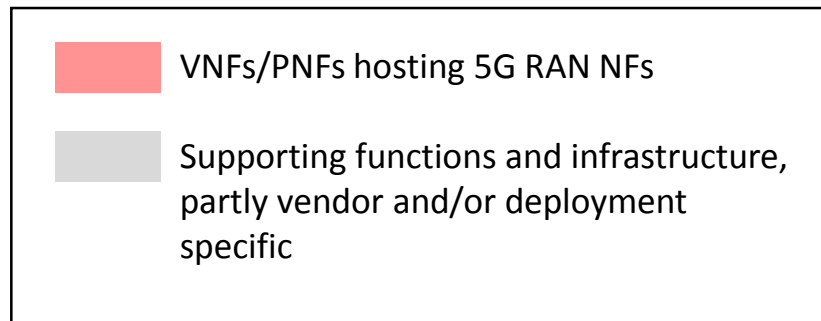
Discuss Casablanca scope

- Edge Cloud Support
- Deploy transport and security infrastructure
- Deploy vendor-specific supporting infrastructure
- Further automation of PnP Discovery for PNF
- Support an integrated configuration design tool in SDC
- Support full Application level Configuration (+Ansible)
- Add needed support for deploying Mobility Virtual Network Elements (e.g. CU) at the Edge locations
- Network monitoring – FM, PM
- Add support for PNF Software Management and Change management
- Add Lifecycle management functions to controller persona
- Closed loop automation

■ Original deployment work item

■ Additional tasks (some may not need additional ONAP enhancements)

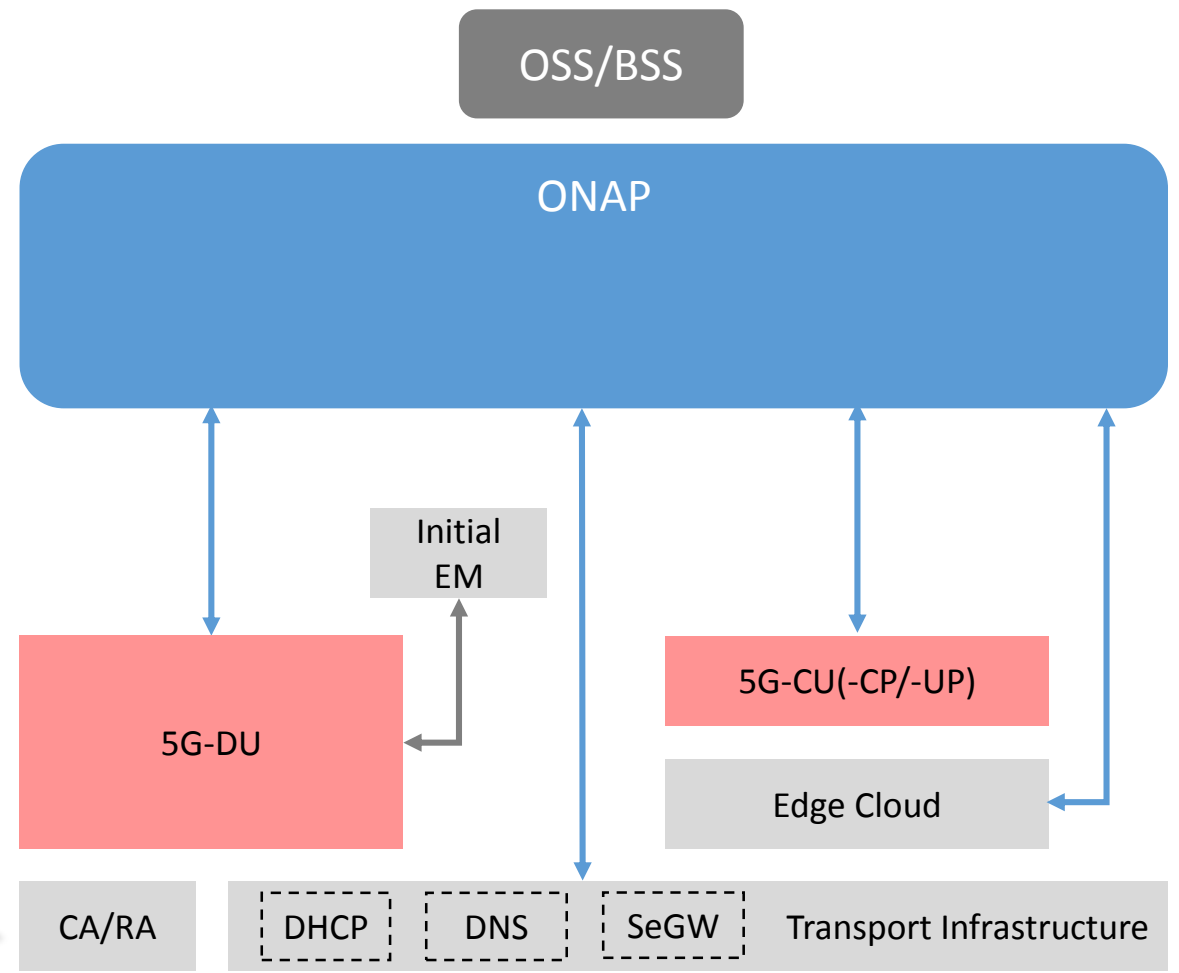
# High Level Proposal – Network View



Notes about 3GPP CU/DU split:

- The radio unit (RU) is logically and management-wise part of the DU
- 3GPP allows but does not specify that CU is implemented as VNF

Some of these functions might be virtualized



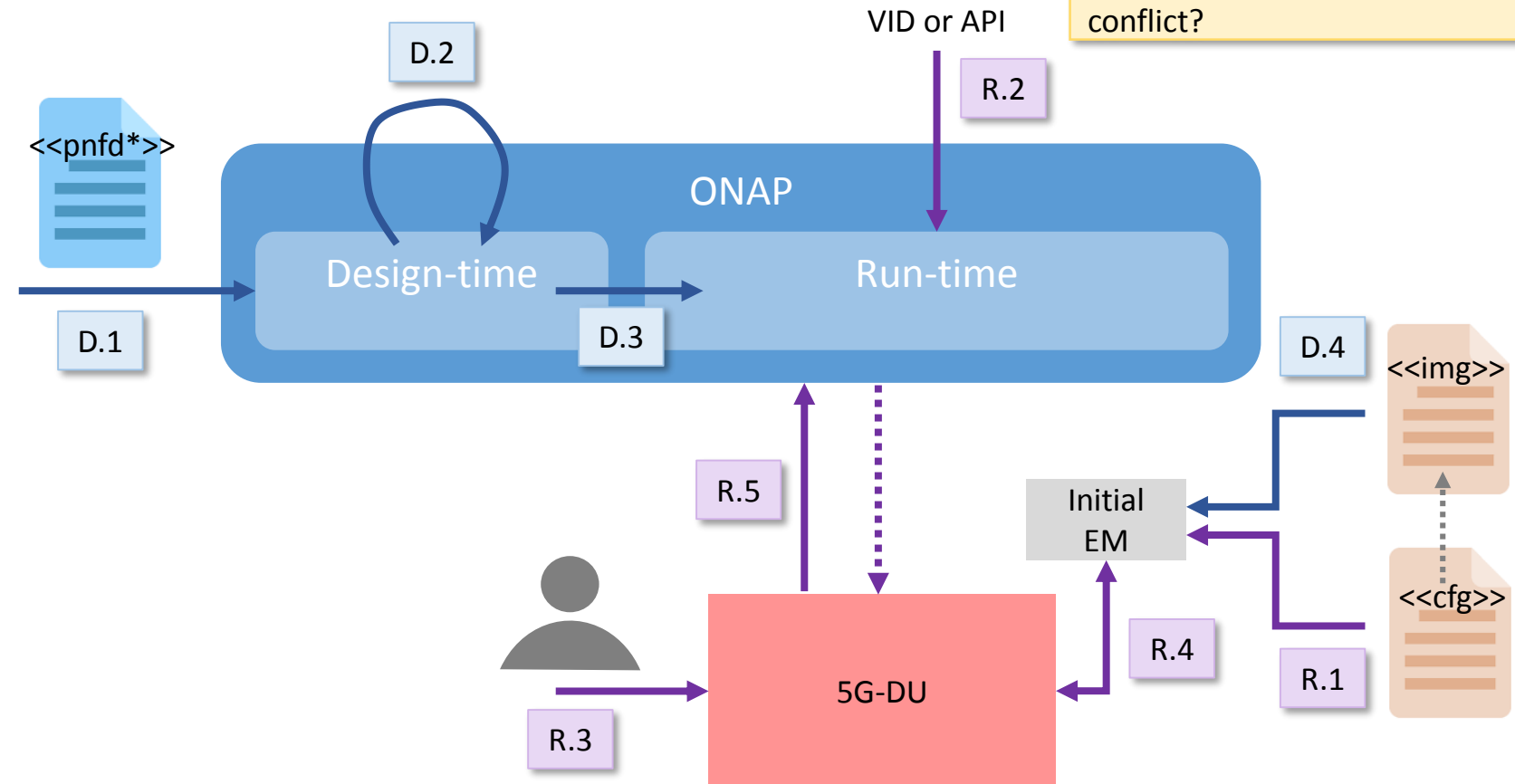
# PNF Support (5G-DU)

- Topics
  - PNF bootstrap/PnP
    - SW handling details
  - Application level configuration
- Builds on PNF registration and orchestration support from Beijing

# PNF Bootstrap/PnP (partly vendor-specific)

- Design-time (template)
  - [D.1] Onboard PNF descriptor/package\*
  - [D.2] Perform resource and service design
  - [D.3] Distribute to run-time
  - [D.4] Upload SW image
- Run-time (instance)
  - [R.1] Upload bootstrap configuration for PNF ID
  - [R.2] Service request including PNF ID
  - [R.3] “Zero-touch” PNF installation
  - [R.4] PNF gets SW and bootstrap configuration from Initial EM
  - [R.5] PNF registers itself with ONAP which allows service request to complete

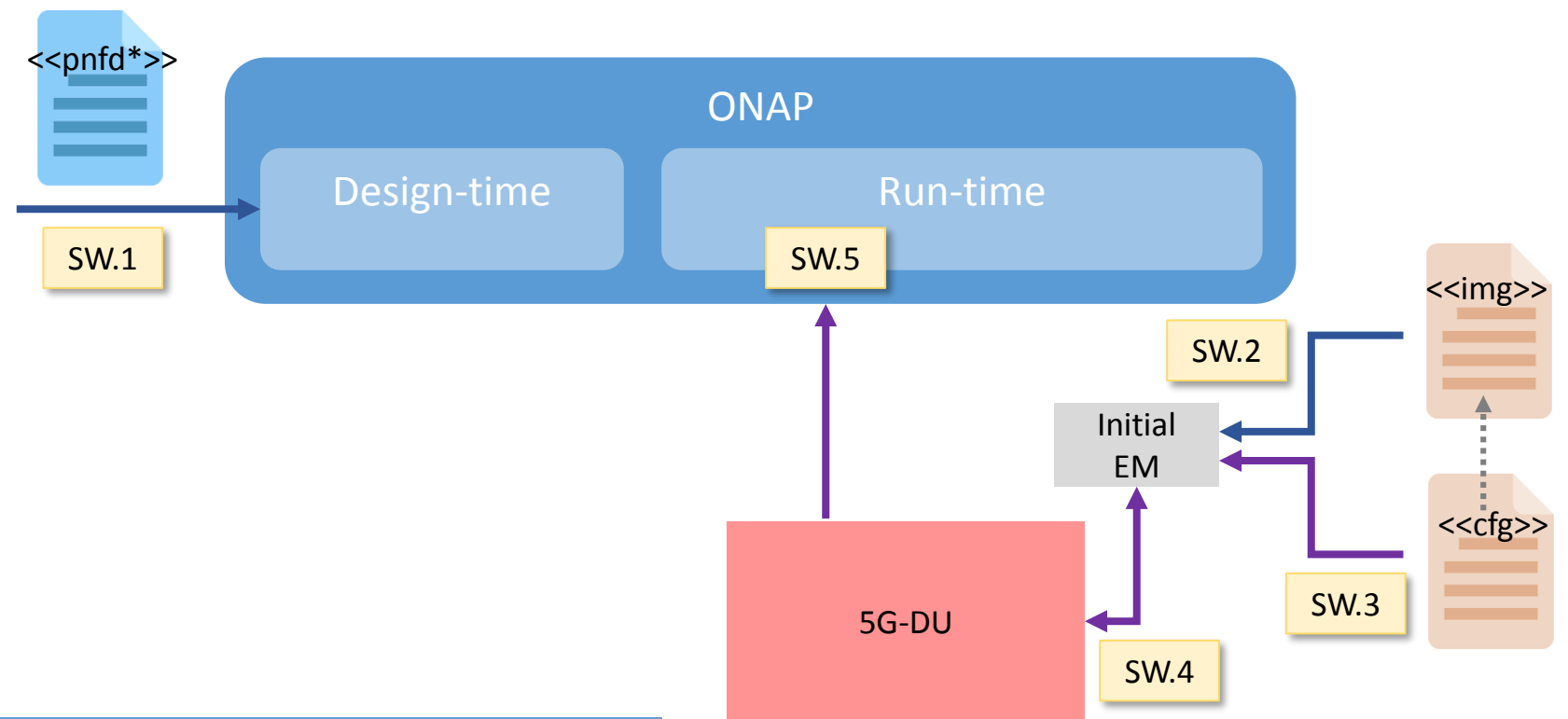
\*) Different content than ETSI NFV PNF descriptor due to extended scope. Use other name to avoid conflict?



Projects: SDC, VID, SO, AAI, DCAE/PRH, VNF/PNF Reqs & SDK

# PNF SW Handling Details (part of Bootstrap/PnP)

- Steps involving SW
  - [SW.1] The onboarded PNF descriptor includes SW version matching the other metadata
  - [SW.2] An operational SW image is uploaded to Initial EM
  - [SW.3] A bootstrap configuration file for a PNF instance is uploaded, containing SW version/image reference
  - [SW.4] On startup, the PNF will fetch the configured SW image
  - [SW.5] The PNF registration event contains SW version information allowing ONAP to check if it is compatible with the PNF descriptor

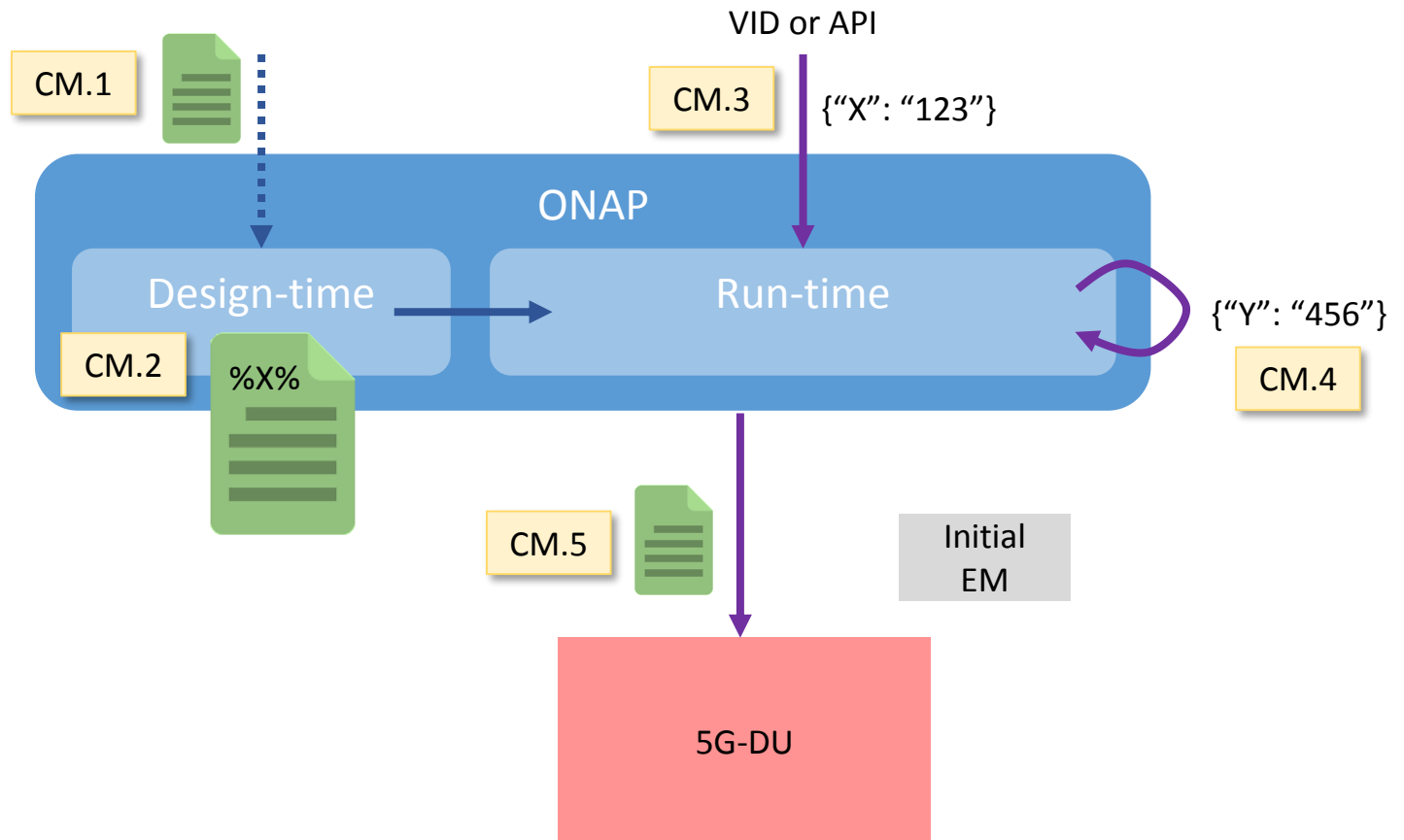


Added or more flexible ONAP workflow to expect operational SW when registering

# Application-level Configuration

For further discussion

- Configuration Steps
  - [CM.1] Configuration templates are either created within SDC or onboarded
  - [CM.2] The configuration templates are connected as artifacts to service/resource
  - [CM.3] At run-time parameter values are provided by ONAP user and used for substitution in template engine
  - [CM.4] Some parameter values are assigned by ONAP itself
  - [CM.5] The final configuration file(s) with instance specific values are sent to the PNF, e.g. using NETCONF (merge)
- Use of Configuration Templates
  - Templates are vendor, product and deployment type specific
  - Assumes sufficient commonality between PNF instances
  - Other UC cases such as closed-loop may need different mechanisms to modify individual attributes



Projects: SDC, VID, SO, AAI, Controller



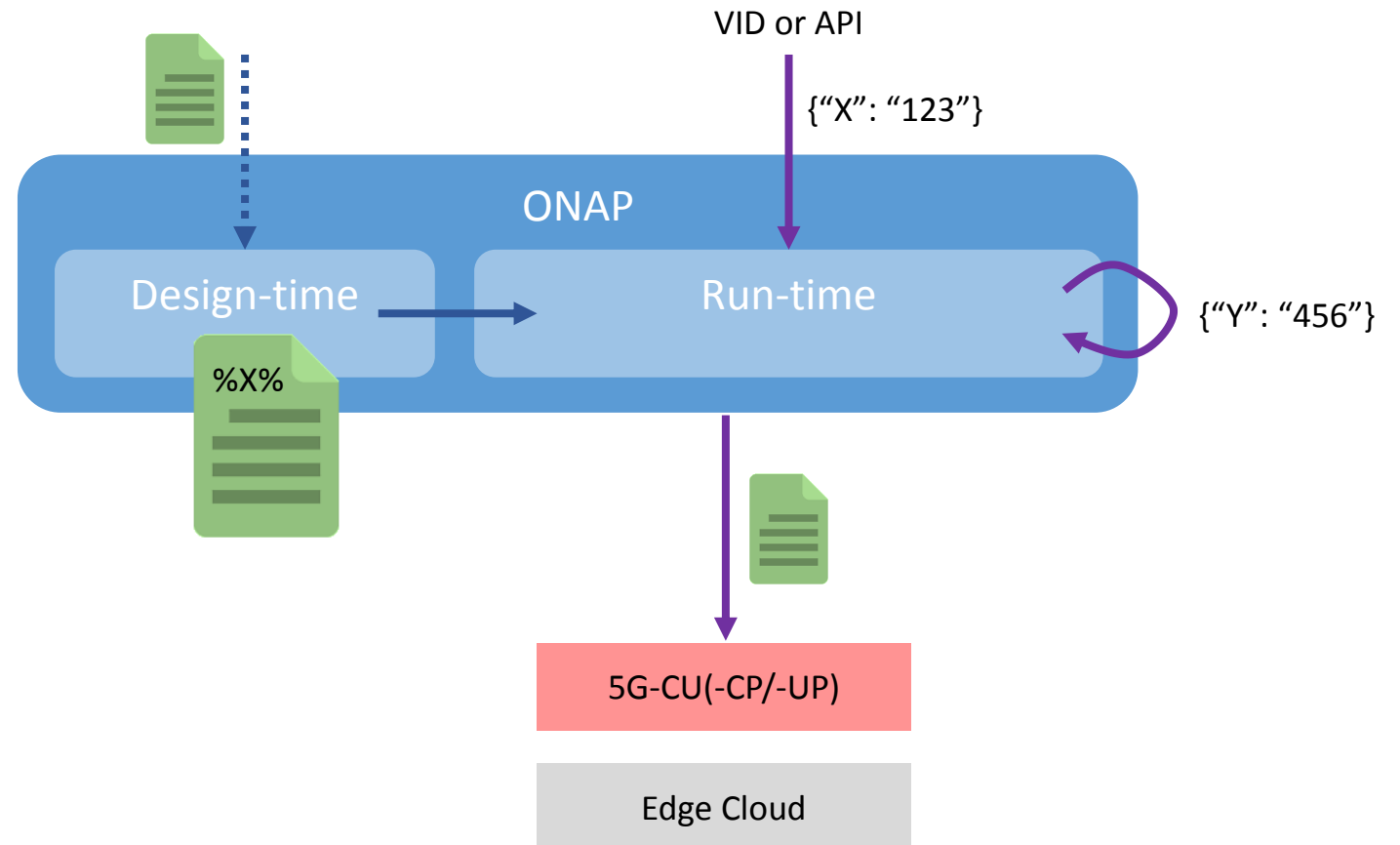
# VNF Support (5G-CU)

- Topics
  - Application level configuration
  - VNF placement on edge cloud
- Several aspects of VNF support is already implemented in Amsterdam/Beijing or addressed by separate use cases such as scaling and change management

# Application-level Configuration

- Once OAM IP address is known, follows same steps as for PNF
  - Expected that a common controller will manage both 5G PNFs and VNFs

Details of what to configure on 5G-DU vs 5G-CU is still being studied in 3GPP, e.g. TS 28.541 (NR NRM)



Projects: SDC, VID, SO, AAI, Controller

# VNF Placement on Edge Cloud

- Assumptions
  - Main problem is to automate and optimize VNF placement with respect to location of PNFs
  - Placement is decided by SO using OOF and policies
- The algorithm will need input data about location of the PNFs as well as available edge clouds (NFVI-PoP)
  - E.g. geo-location or more detailed information about physical transport topology
  - This information should exist in AAI, added from OSS/BSS or by cloud/infrastructure/PNF itself
    - Run-time (instance) rather than design-time (template) attribute
- Additional notes
  - It is necessary that services are designed in a way that SO has information about both PNFs and VNFs
    - E.g. if 5G-DU PNF is added later to already deployed 5G-CU VNF, it is not possible to optimize the VNF placement
  - 5G-DU can be geographically distributed, e.g. remote radio or multiple antenna locations
    - But location of the connection point to the transport network is most important for the placement decision

Projects: SDC, SO, OOF, AAI, DCAE/PRH, Multi-Cloud



**ONAP**

OPEN NETWORK AUTOMATION PLATFORM

Thank You