

Network Slicing with O-RAN implemented in ONAP



OPEN SDN & NFV LAB

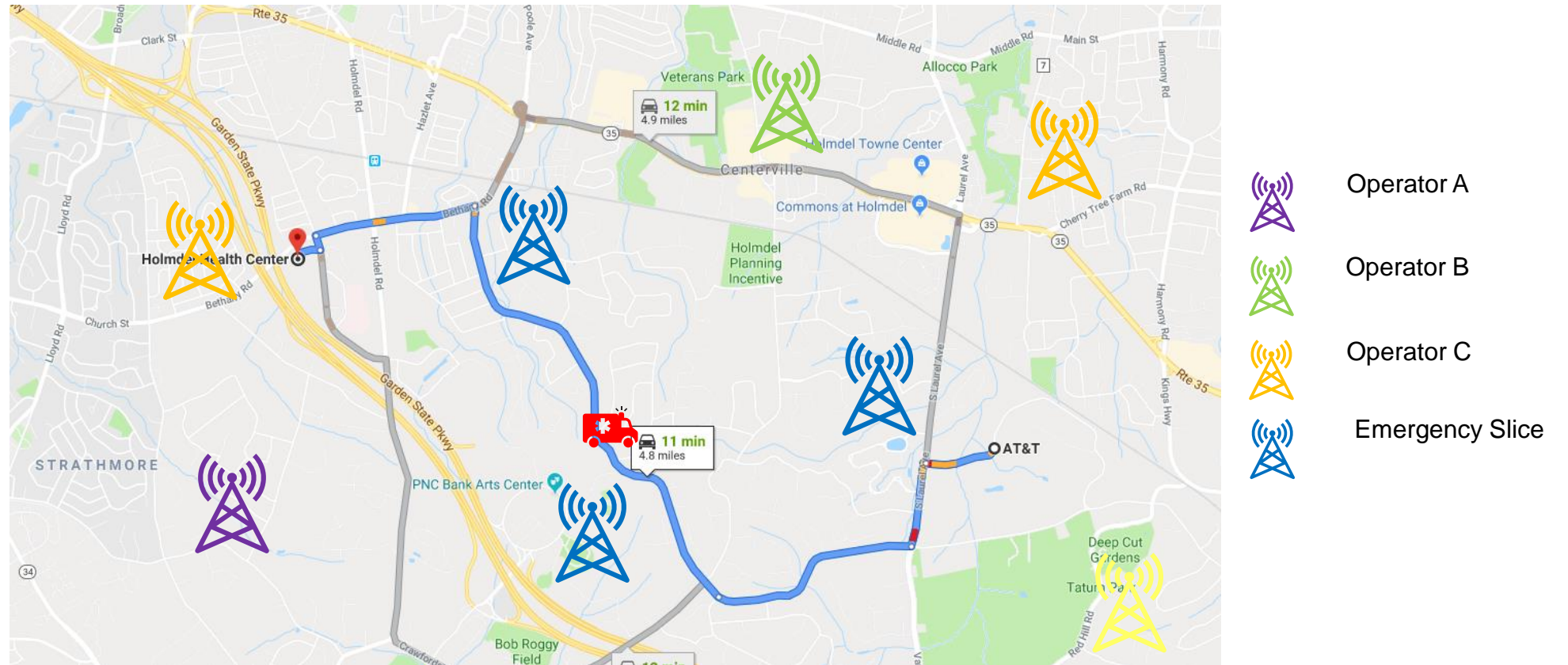
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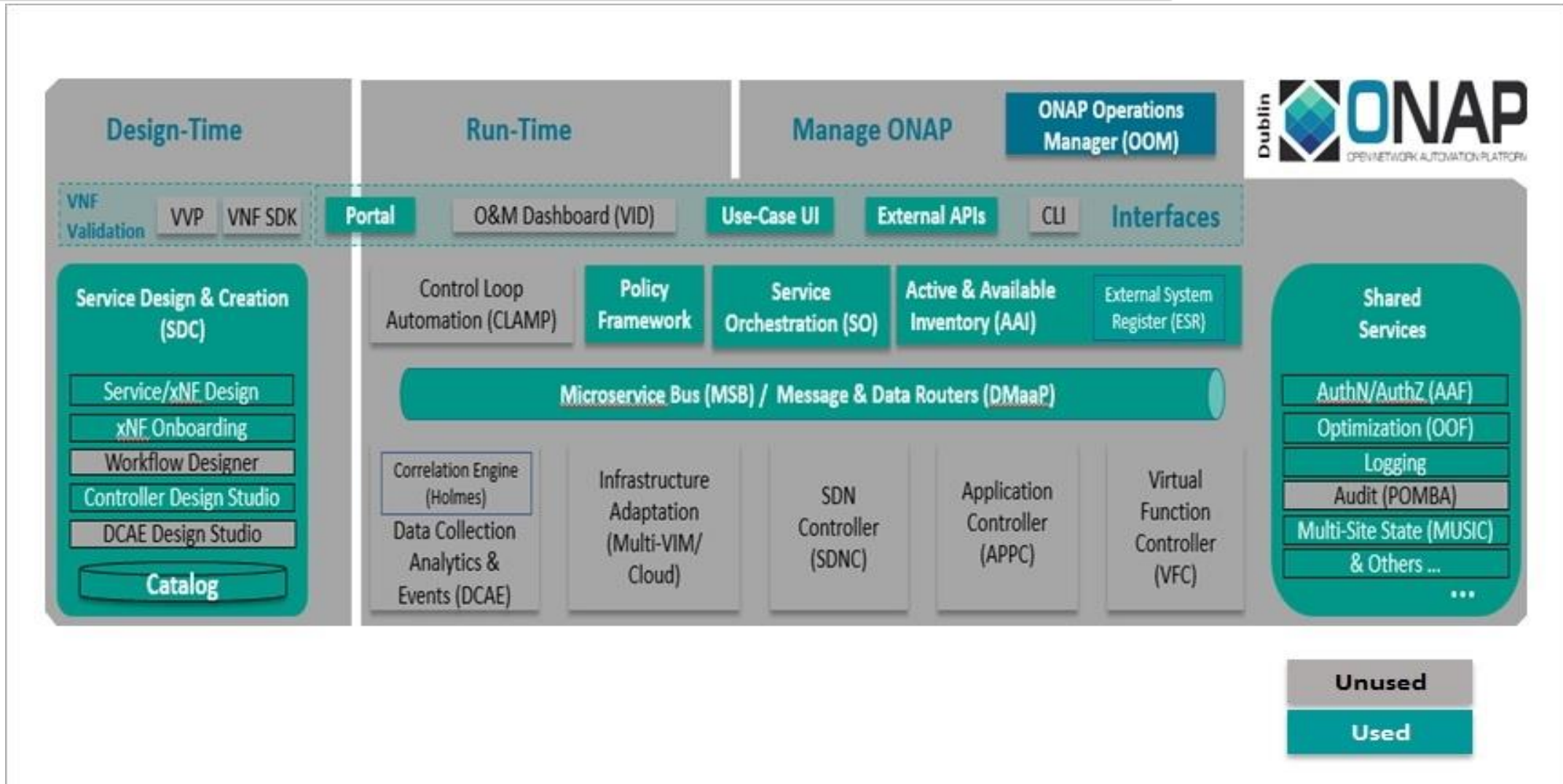
Network Slicing Use Cases from O-RAN UCTG

- Context-Based Dynamic HO Management for V2X
 - allowing operators to adjust radio resource allocation policies through the O-RAN architecture, reducing latency and improving radio resource utilization
- Flight Path Based Dynamic UAV Radio Resource Allocation
 - allowing operators to adjust radio resource allocation policies through the O-RAN architecture, reducing unnecessary handover and improving radio resource utilization
- Radio Resource Allocation for UAV Application Scenario
 - allowing operators to adjust radio resource allocation policies through the O-RAN architecture, reducing latency and improving radio resource utilization
- QoE Optimization
 - For example Cloud based Virtual Reality applications.

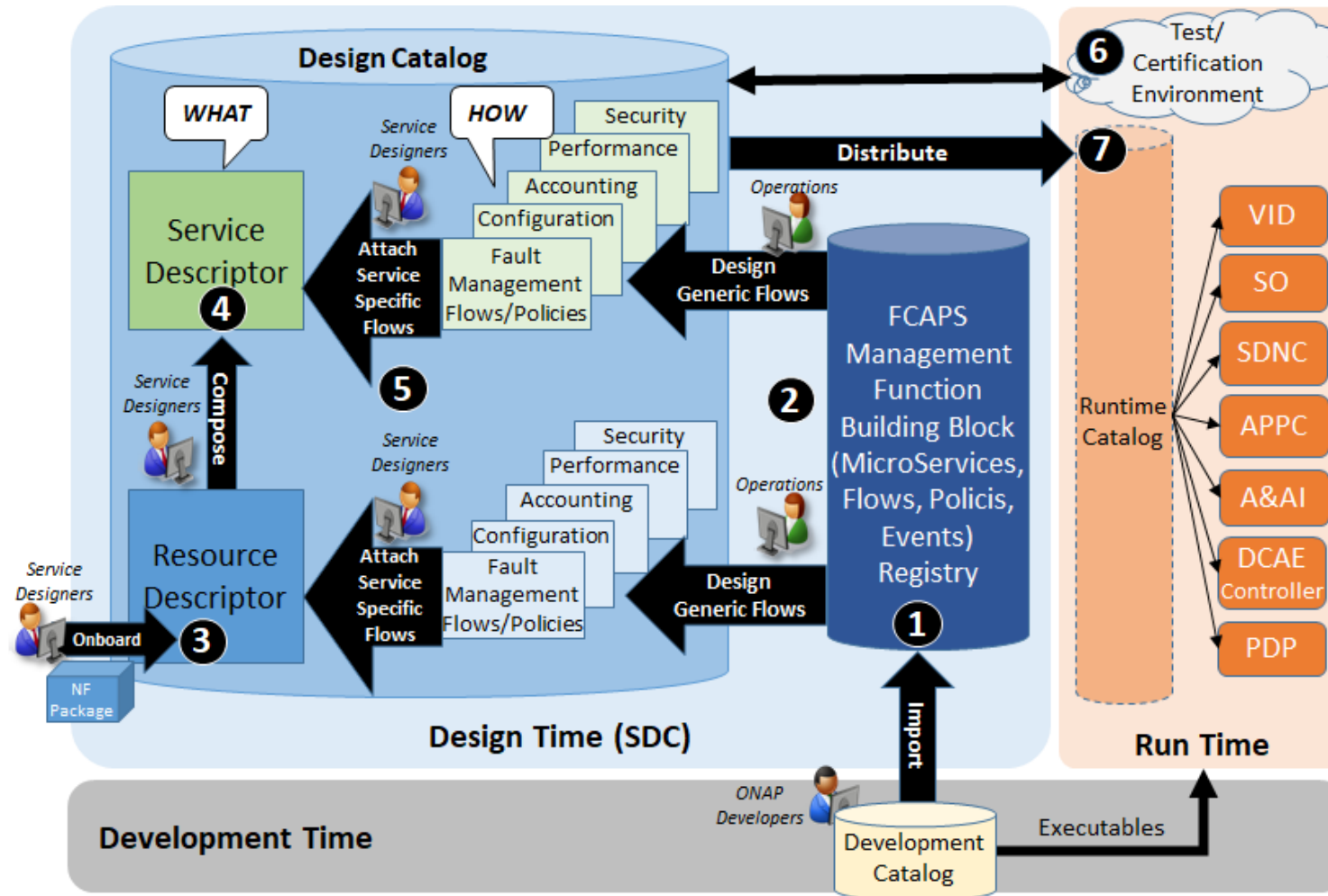
Use case for V2X with Emergency scenario



Components used in network slicing in ONAP



Service Design & Creation (SDC)



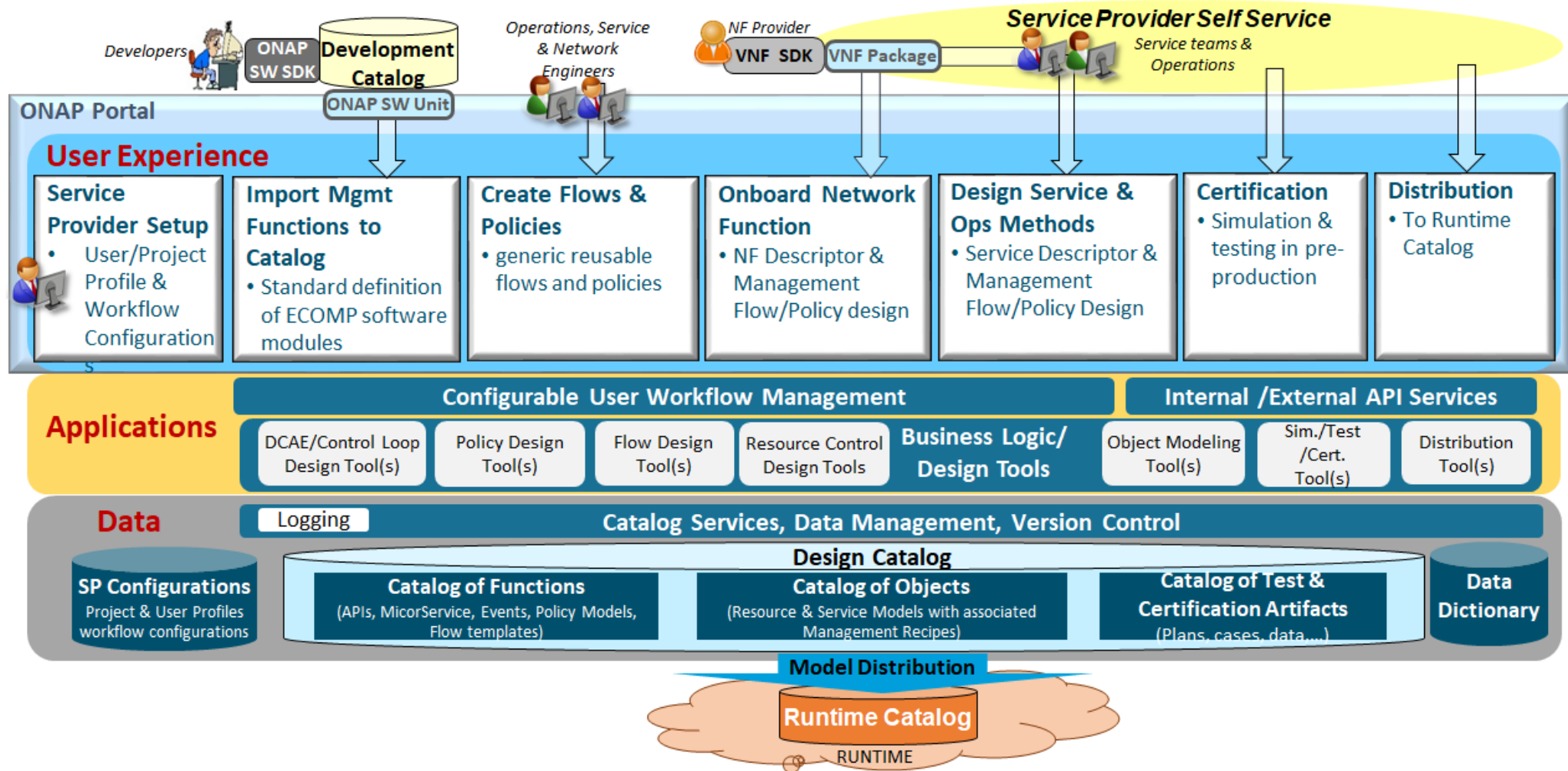
7 (*Note: Runtime Catalog is yet to be deployed. Current distribution is from SDC to each runtime component. See SDC API definitions diagram)

Service Design & Creation (SDC)

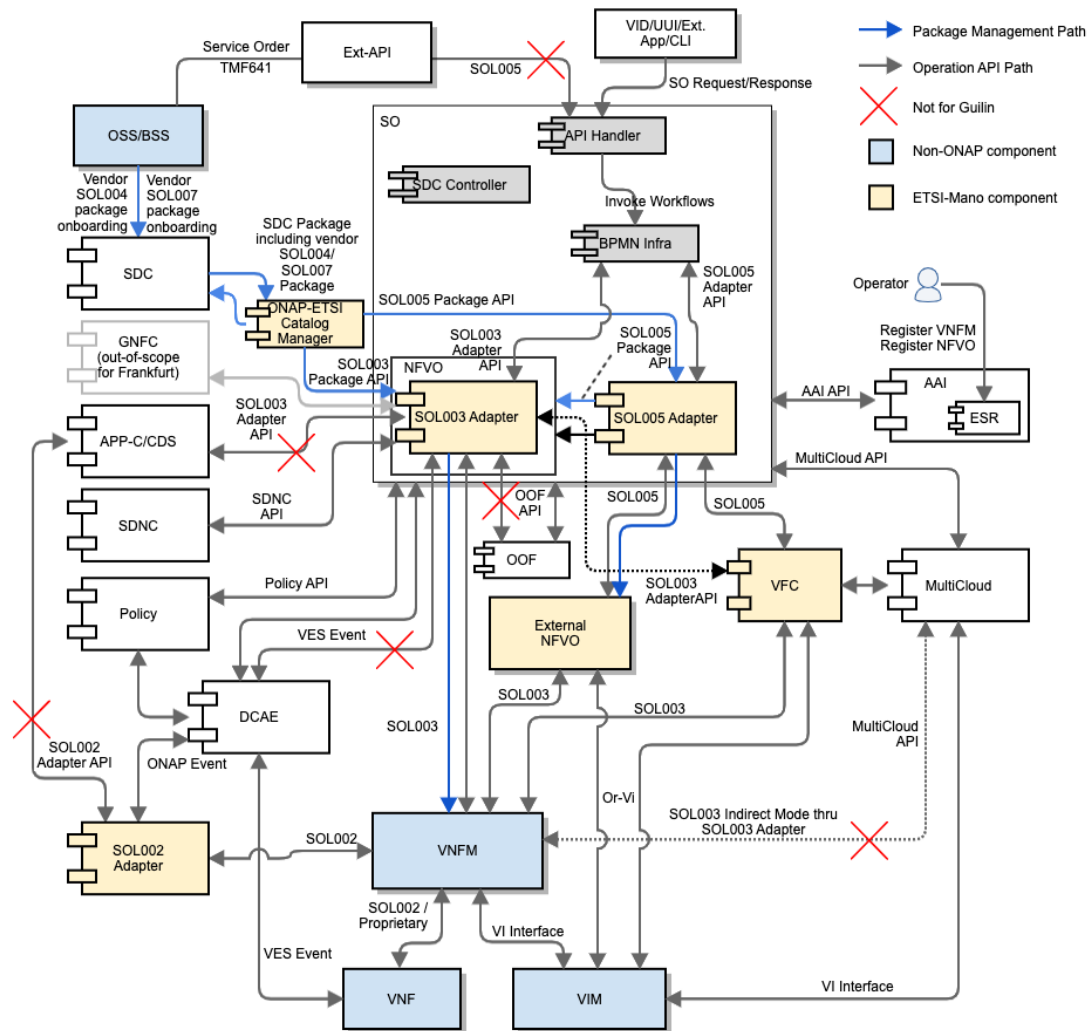
SDC is the Centralized ONAP Design Time Platform

- SDC Provides Service Provider a seamless design time user experience
 - Allow SP to configure for its design environment including user roles and design workflows
 - Import generic ONAP management functions (MS, Flows, Policies) from ONAP developed software and SP's adaptations (1) (2)
 - Onboard & Design resource level network functions (VNF, PNF) (3)
 - Compose Service models with resources (4)
 - Design Service Provider specific Management Flows and Policies for the Resource or Service Model (5)
- SDC integrates multi design tools into one platform
 - Provide ONAP development a “Pluggable framework” for easy design tools integration
- SDC Provides a common Catalog for designed objects
 - Support robust catalog cataloging capabilities for storage and management of ONAP standard compliant data models
- Provide linkage & management of SP's Test/validation process & artifacts for certification of the designed models (6)
- Distributes models to runtime for execution (7)

Service Design & Creation (SDC)



Service Orchestration (SO) R7 Guilin



ETSI-Alignment Support for Guilin

ETSI MANO and ONAP ETSI Alignment Landscape

As part of aligning ONAP to ETSI MANO, ONAP supports ETSI standards for packaging, operations and monitoring for managing VNF, PNF and NS.

- RAN Slicing
 - Service/Template Design: Successful design of RAN NSST, RAN NF NSST, RAN Slice Profile and RAN NF Slice Profile Templates
 - Service Instantiation with - New NSI, new RAN NSSI: Provide RAN subnet capabilities when queried by NSSMF adaptor
 - When triggered by NSSMF Adaptor with allocateNSSI for allocating a new RAN NSSI, RAN NSSMF (SO) triggers OOF for RAN NSSI selection, OOF provides Slice Profiles for RAN NF, TN FH and TN MH NSSIs (i.e., creation of a new RAN NSSI).
 - SO (RAN NSSMF) creates new RAN NF NSSI and configuring it by calling SDN-R.
 - SO (RAN NSSMF) makes suitable updates to AAI about Slice Profiles, RAN NF NSSI, etc.

Ongoing work in network slicing R7 Guilin

- ONAP and O-RAN community are planning on implementing Test Cases defined for the Guilin Release
- Defining Honolulu scope and contents
- Planning design for Core Slicing
- Demo planned in Jan/Early Feb 2021

Planned in ONAP Honolulu release

Honolulu release plans for E2E Slicing

Functional view

Note: Priority **1** items are proposed to be part of Honolulu. Priority 2 items will be considered as "Stretch goals".

Track	Details	Impacted Component(s)	Companies
Guilin functional enhancements	Completion of remaining Guilin Integration Tests, fixing of related bugs (across all tracks)	UUI, SO, OOF, SDN-C/CCSDK, DCAE, Policy, ExtAPI	CMCC, Wipro, Tech Mahindra, TIM, Huawei, LTTS
	Endpoint related enhancements (NSMF, RAN/Core/TN NSSMF)	UUI, SO, OOF, SDN-C/CCSDK	CMCC, Wipro, Tech Mahindra, TIM, Huawei
	3GPP API alignment (Service/Slice Profile - e.g., coverageArea and coverageAreaTAList), modeling enhancements, minor workflow enhancements for NSMF, all 3 NSSMFs and NSSMF adaptor for e2e network slice	SO, AAI	CMCC, Wipro, Tech Mahindra, Huawei
	NST selection enhancement	OOF	Huawei, Wipro
	Use of resource occupancy levels in NSI/NSSI for NSI/NSSI selection (involves collecting and storing/analyzing the data, and then using this info for NSI/NSSI selection) (ArchCom)	DCAE (to be confirmed), SO, OOF	Wipro
	TMF 641 alignment for Slice LCM	UUI	CMCC

Planned in ONAP Honolulu release

Honolulu release plans for 5G Slicing

RAN Slicing	A1 interface for Closed Loop and Intelligent Slicing	SDN-R/CCSDK	Wipro, IBM
	RAN Slice resource (re)allocation, Slice profile decomposition at Near-RT RIC level	SDN-R/CCSDK, OOF	Wipro, IBM
	Coverage Area to TA mapping	SO/OOF?	Wipro
	RAN Service enhancements, including service instantiation actions	SO, SDN-R/CCSDK	Wipro
	3GPP specs related enhancements including yang updates	SDN-R/CCSDK	Wipro, IBM
	Use of CPS instead of Config DB	SDN-R, DCAE	Wipro, IBM
Core Slicing	Enhancements to Core NF configuration	SO, CDS	Tech Mahindra, TIM
	Core NF placement	SO, OOF	Tech Mahindra, Wipro

Planned in ONAP Honolulu release

Transport Slicing	Enhancements related to TN NSSI reuse, considering occupancy levels, modification of associated NSSI with SLA, etc.	SO, SDN-C/CCSDK	Huawei
	TN model enhancements, alignment to SDOs	SO, AAI, SDN-C	Huawei
	Support of MP to MP connection	SO, OOF, SDN-C	Huawei, Wipro
KPI Monitoring	Complete PM-mapper/new MS with all required functionality for KPI computation (ArchCom)	DCAE	CMCC
	Computation of KPIs at NSI/NSSI level, policy-driven list of KPIs	DCAE	CMCC
	Retrieval of historic KPI values for Closed Loop and by UUI	DCAE	CMCC, Wipro
	TMF 628 API support for KPI monitoring (ArchCom)	ExtAPI, UUI	Wipro
	Aggregator function (to aggregate data from all NFs of same type, otherwise KPI computation logic to be refined) (ArchCom)	???	???
Closed Loop	Closed Loop scenario involving RAN and Core - details being worked out	SO, DCAE, SDN-R/CCSDK	Wipro (RAN, RAN Simulator), IBM (SDN-R), LTTS (Core NF Simulator)
Intelligent Slicing	Enhance existing scenario with Core	DCAE, SDN-R/CCSDK	Wipro, IBM
Modeling enhancements	<ul style="list-style-type: none"> • RAN service design enhancements • Endpoints • Service and Slice Profiles 	SDC, AAI, SO	CMCC, Amdocs, Wipro

Thank You!

Acronyms and Abbreviations

BSS/OSS	Business Support Systems/Operations Support Systems
EMS	Element Management System
FCAPS	Fault, Configuration, Accounting, Performance, Security
IaaS	Infra structure as a Service
KPI	Key Performance Indicator
MANO	ETSI Management and Orchestration
LCM	Life Cycle Management
MNO	Mobile Network Operator
M&O	Management & Orchestration
NaaS	Network as a Service
NGMN	Next Generation Mobile Networks
NMS	Network Management System
NSMF	Network Slice Management Functions
NSSMF	Network Slice Subnet Management Function
NFVI	Network Functions Virtualisation Infrastructure
NVFO	Network Virtualization Function Orchestrator
PNF	Physical Network Function
RAN	Radio Access Network
SLA	Service Level Agreement
VIM	Virtualised Infrastructure Manager
VNF	Virtualised Network Function