E2E Network Slicing Use Case in R6 Frankfurt

NoteThe earlier "NETWORK SLICING PoC" and "Vertical Industry Oriented On-demand 5G Service" have been merged into one use case. This use case "E2E Network Slicing Use Case" is the new joint use case for Frankfurt and the future releases.

Participants: China Mobile, Wipro, Huawei, AT&T, Amdocs, Verizon, Reliance Jio, Tencent, China Telecom

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Business Driver

Executive Summary: 5G Network Slicing is one of the key features of 5G. The essence of Network Slicing is in sharing network resources (PNFs, VNFs, CNFs) while satisfying widely varying and sometimes seemingly contradictory requirements to different customers in an optimal manner. Same network is expected to provide different Quality of Experience to different consumers, use case categories and industry verticals including factory automation, connected home, autonomous vehicles, smart cities, remote healthcare, in-stadium experience and rural broadband. An End-to-End Network Slice consists of RAN, Transport and Core network slice sub-nets. This Use Case intends to demonstrate the modeling, orchestration and assurance of a simple network slice (e.g. eMBB). While 3GPP standards are evolving and 5G RAN and core are being realized, this Use Case will start with realizing an E2E Network Slice with a simple example of a 5G RAN, Core and Transport Network Slice sub-nets. It will also align with relevant standard bodies (e.g., 3GPP, ETSI, TM Forum) as well as other open initiatives such as O-RAN where relevant, w.r.to both interfaces as well as the functional aspects.

Business Impact: Network Slicing is a feature that almost every service provider will leverage. It allows a service provider to improve their network efficiency by maximizing the network throughput more tailored to each user's use of the network. It is seen as an imperative for efficient and optimal use of their network. This will be particularly relevant as 5G is expected to have upwards of 10,000x the traffic load over 4G and 20GB peak data rates.

Business Markets: Network Slicing, for this use case, is specifically aimed at a 5G access, core and transport. In the future, this might be extended to other domains or applications such as fixed-wireless convergence, Wi-Fi access, all aspects of transport including fronthaul, or unified network management orchestration. Network Slicing functionality is what almost every wireless service provider will inevitably find valuable. The concepts and modeling work being done for Network Slicing will find applications in other areas as well. (Industries) Some applications and industries such as smart cities, remote maintenance, video streaming vs life-saving first-responder type applications will demand different requirements from Network slicing. (Markets/Regions) There are no regional specific aspects to Network Slicing.

Funding/Financial Impacts: Network slicing engenders the optimal use of resources for a Network. Thus, this represents OPEX savings for a service provider.

Organization Mgmt, Sales Strategies: There is no additional organizational management or sales strategies for this use case outside of a service providers "normal" ONAP deployment and its attendant organizational resources from a service provider.

DEVELOPMENT IMPACTS

Requirement	~~REQ-158~~ - E2E Network Slice orchestration in R6 Frankfurt DONE		
PROJECT	**PTL**	**User Story / Epic**	**Requirement**
A&AI	James Forsyth	~~AAI-2600~~ - A&AI support of Network Slicing Demo in Frankfurt CLOSED	No code impact foreseen for Frankfurt release. Update A&AI schema with Network Slicing model
AAF	Jonathan Gathman		No impact foreseen for Frankfurt release
APPC	Takamune Cho	Need to check whether this is needed.	No impact foreseen for Frankfurt
CLAMP	Gervais-Martial Ngueko		No impact foreseen for Frankfurt release

CC-SDK	Dan Timoney		No impact foreseen for Frankfurt release
DCAE	Vijay Venkatesh Kumar		Not included in Frankfurt scope. May be realized as a PoC. ~~DCAEGEN2-1878~~ - Support 5G slicing - E2E network slicing use case CLOSED has been moved to Guilin release
DMaaP	Mandar Sawant		No impact foreseen for Frankfurt release
External API	Adrian OSullivan	~~EXTAPI-349~~ - Support E2E network slicing use case CLOSED	Service order API enhancements alone in scope for Frankfurt.
Integration	Morgan Richomme	~~INT-1467~~ - Integration of E2E Network Slicing use case into ONAP test suites CLOSED	
MODELING	Hui Deng		Intention is to re-use existing constructs for Frankfurt release.
Multi-VIM / Cloud	Bin Yang		No impact foreseen for Frankfurt release
OOF	Shankaranarayanan Puzhavakath Narayanan	~~OPTFRA-277~~ - OOF impacts on 5G slice optimization CLOSED	• OOF shall select appropriate NST(s) • OOF shall select appropriate NSI(s) as well as provide recommendations for creating new NSI.
POLICY	Pamela Dragosh	~~POLICY-2056~~ - Policy support of Network Slicing Demo in Frankfurt CLOSED	No code impact foreseen for Frankfurt release • Config policy for slice allocation, slice sharing, slice sub-net allocation and slice sub-net sharing • Config policy for optimization constraints
PORTAL	Manoop Talasila		No impact foreseen for Frankfurt release
SDN-C	Dan Timoney		Not in scope for Frankfurt release, may be realized as a PoC. ~~SDNC-915~~ - SDN-C (SDN-R) support of E2E Network Slicing in Guilin CLOSED has been moved to Guilin release.
SDC	Ofir Sonsino	~~SDC-2555~~ - SDC support of Network Slicing Demo in Frankfurt CLOSED	No code impacts for Frankfurt release
SO	Seshu Kumar Mudiganti	~~SO-2368~~ - Support 5G slice orchestration CLOSED	• CSMF impacts, workflows for service instantiation, involving service decomposition, NST selection, NSI allocation trigger, service instantiation • NSMF impacts, workflows for NSI selection, NSI instantiation, NSSI selection, trigger for NSSI instantiation, NSI activation • Interface to external NSSMF • Store slice catalog items, update active slice inventory (NSSMF impacts still under discussion with ArchCom, not in scope for Frankfurt release)
VID	Ittay Stern		No impact foreseen for Frankfurt release
VF-C	Yan Yang		Not in scope for Frankfurt release, potential NSSMF functionality under discussion
VNFRQTS	Steven Wright		No impact foreseen for Frankfurt release
VNF-SDK	Weitao Gao		No impact foreseen for Frankfurt release
CDS	Yuriy Malakov		No impact foreseen for Frankfurt release
UUI	Tao Shen	~~USECASEUI-333~~ - UUI Support Vertical Industry Oriented On-demand 5G Service CLOSED	CSMF portal and NSMF portal
Runtime DB	Benjamin Cheung Joanne Liu Rudel		Not in scope for Frankfurt release, as this is not yet an official ONAP component. It is intended to contain RAN slice subnet inventory (config and runtime details) beyond Frankfurt.

List of PTLs:**Approved Projects**

Test cases

Further details will be updated in Functional Test Cases.

No.	Description	Status
1	Successful design of CST ,Service Profile Template	NOT YET TESTED
2	Successful design of NST, NSST	NOT YET TESTED
3	Service instantiation via CSMF portal resulting in NSI selection without any override by operator via NSMF portal - new NSI to be instantiated	NOT YET TESTED
4	Service instantiation via CSMF portal resulting in NSI selection without any override by operator via NSMF portal - existing NSI to be selected	NOT YET TESTED
5	Service instantiation via CSMF portal resulting in NSI selection with operator overriding automatically selected option from NSMF portal - new NSI to be instantiated	NOT YET TESTED
6	Service instantiation via CSMF portal resulting in NSI selection with operator overriding automatically selected option - existing NSI to be selected	NOT YET TESTED
7	Service activation from CSMF portal – resulting in slice service activation	NOT YET TESTED
8	Service de-activation from CSMF portal – resulting in slice service deactivation	NOT YET TESTED
9	Service termination (remove service profile/slice profile from NSI/NSSI)	NOT YET TESTED
10	Service instantiation request via ExtAPI (using postman) - resulting in new NSI to be instantiated	NOT YET TESTED
11	Service instantiation request via ExtAPI (using postman) - resulting in reuse of existing NSI	NOT YET TESTED

Supporting Files

Description	File
Presentation to ArchCom on 22 Oct, 2019	ONAP_Network_Slicing_Joint_Proposal_Arch_Com_22Oct_2019_v1.0.pptx
Presentation to ArchCom on 05 Nov, 2019	ONAP_E2E_Network_Slicing_Arch_Com_05Nov_2019_v2.0.pptx
(Brief) Presentation to ArchCom on 19 Nov, 2019	ONAP_E2E_Network_Slicing_Arch_Com_19Nov_2019_v3.0.pptx
Presentation at Prague DDF on 14 Jan, 2020	ONAP_E2E_Network_Slicing_DDF_Comb-v1.0.pptx
Presentation to ArchCom on 25 Feb, 2020	ONAP_E2E_Network_Slicing_Arch_Com_200225-V0.3.pptx
Presentation to Requirements Sub-Committee on 2 Mar, 2020	ONAP_E2E_Network_Slicing_Req_Subcommittee_Mar2_v1.0.pptx