

Open Source
MANO

Deploying Landslide 5G test solution in OSM
OSM-MR#9 Ecosystem Day

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Spirent Communications

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Spirent Communications



We develop products and services to shorten our customers' product development lifecycle, improve the quality of their products & networks, improve their customers experience, and reduce their costs & risk.

We enable and assure the functionality, performance and security of connected devices, network equipment, networks and services.

We provide expert guidance and methodologies to help our customers find clarity in the face of complexity, overcome their challenges, and ultimately deliver on their promise to their own customers.

A LEADER IN THE TESTING INDUSTRY

<u>Global Customers</u>	<u>Spirent Employees</u>	<u>Countries Served</u>
1,500+	1,500+	50

<u>Sales (2019)</u>	<u>R&D Investment</u>
\$500+ M	\$100+ M

THE PROMISE OF PERFORMANCE



- Service Assurance & Analytics
- Cloud Infrastructure Validation
- High Speed Network Performance
- Cybersecurity
- Positioning, Navigation & Timing
- Wireless Device Performance & Service Experience
- Automotive

Business Units

Networks & Security



Provide automated performance and security test systems to accelerate development of new devices, networks and applications.

Lifecycle Service Assurance



Provide active test and analytics solutions for service turn-up, network performance improvement and customer experience management.

Connected Devices



Provide automated test systems to accelerate the development of connected devices and to simplify connecting them to the network.

By being the best at ...

Test Methodologies

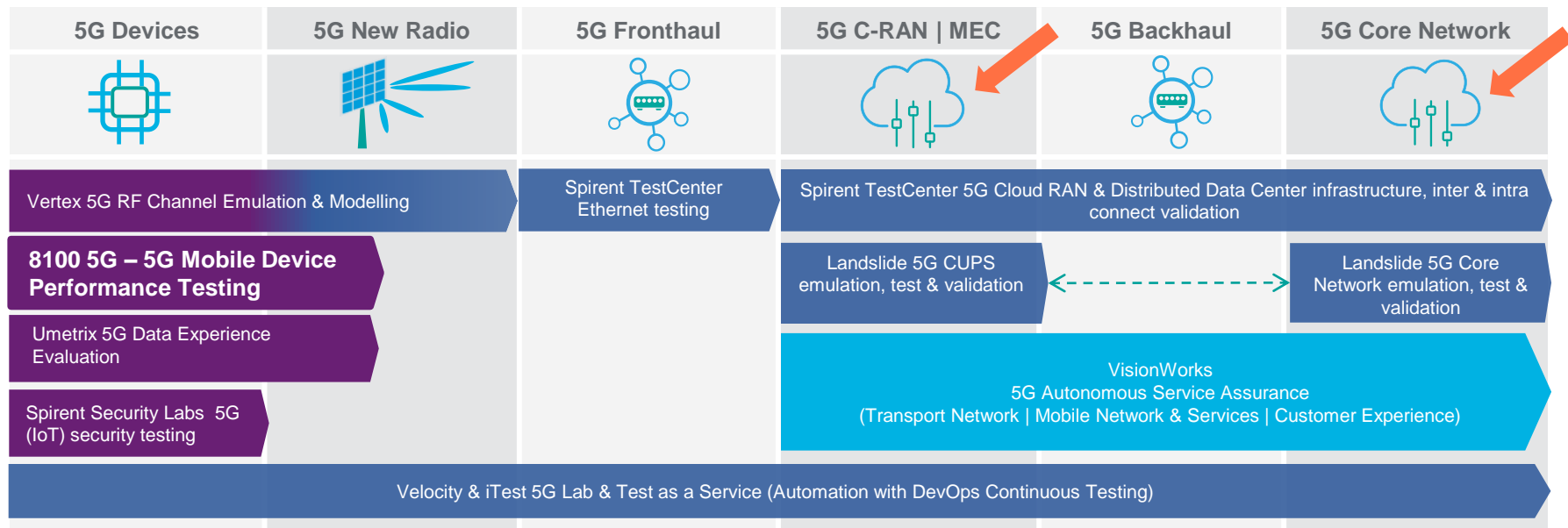
| Active Test

| Analytics

| Automation

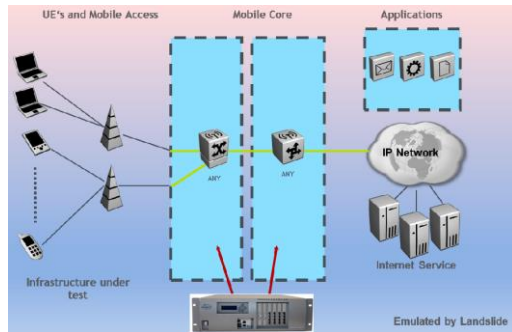
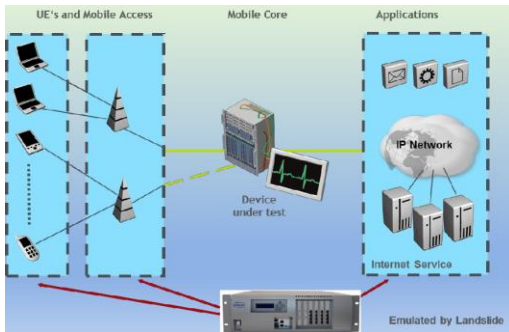
Spirent 5G Portfolio

- Network Testing
- Device Testing
- Service Assurance



What is Landslide ?

Landslide is a mobile core network testing and emulation solution for lab and production environments.



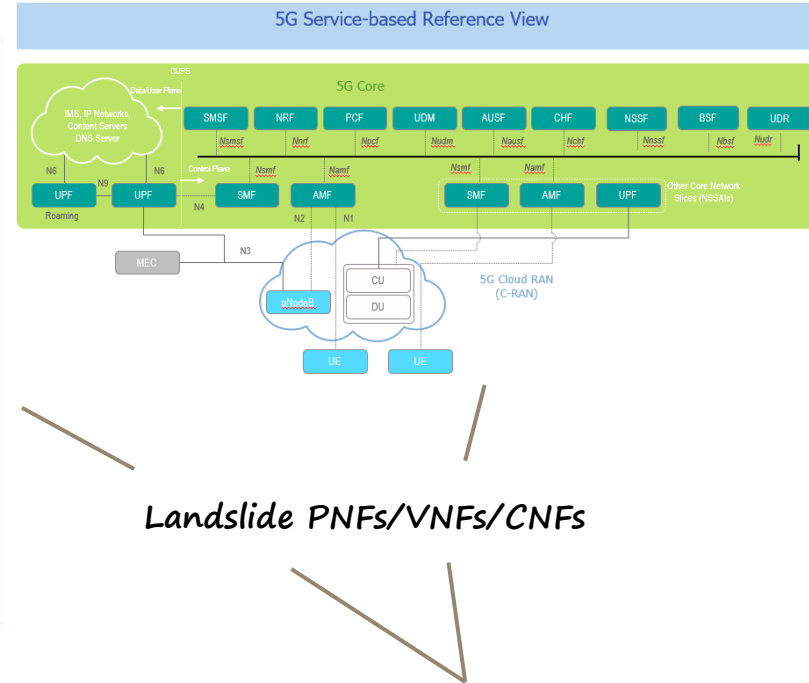
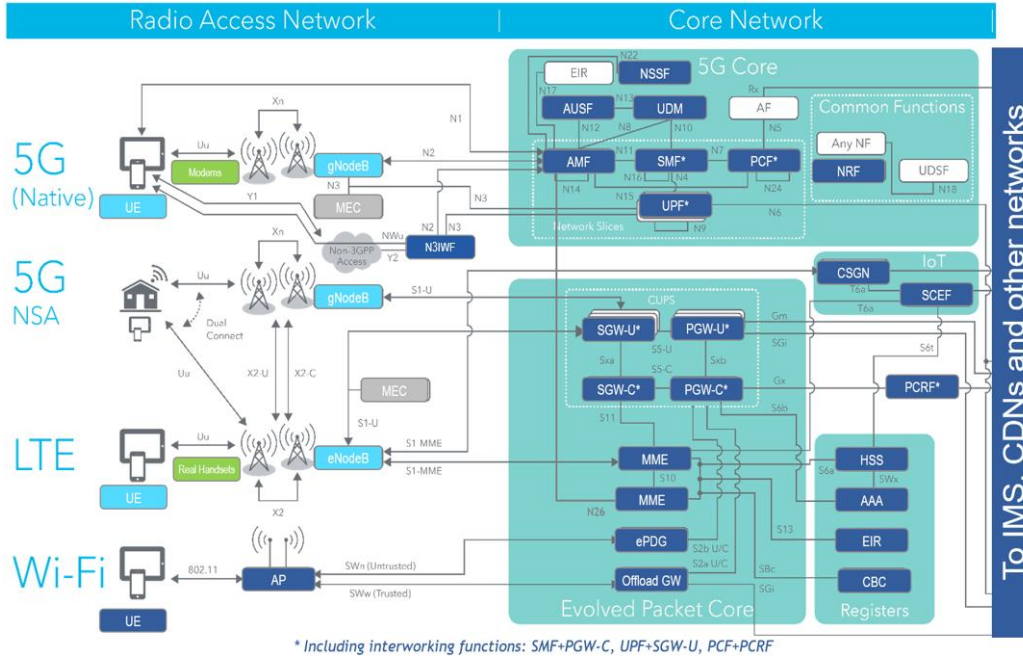
To perform End-to-End and/or Node isolation assessments

- 5G SA Core testing & emulation
- 5G service-based architecture testing & emulation
- 5G native slicing testing and emulation
- 5G NSA options 3/3a/3x testing and emulation
- 5G IoT device and network testing
- R14 CUPS testing and emulation
- Legacy core network emulation for iRAT
- Full mobility Intra and Inter-RAT

- BH Call Modeling
- DPI/Data Performance
- Security/IPsec
- Core Services: FWA Voice, Video, Data
- Negative testing
- 5G CU/DU testing and emulation
- Virtual and Hybrid Networks Testing
- Virtual functions autoscaling test

What are Landslide NFs ?

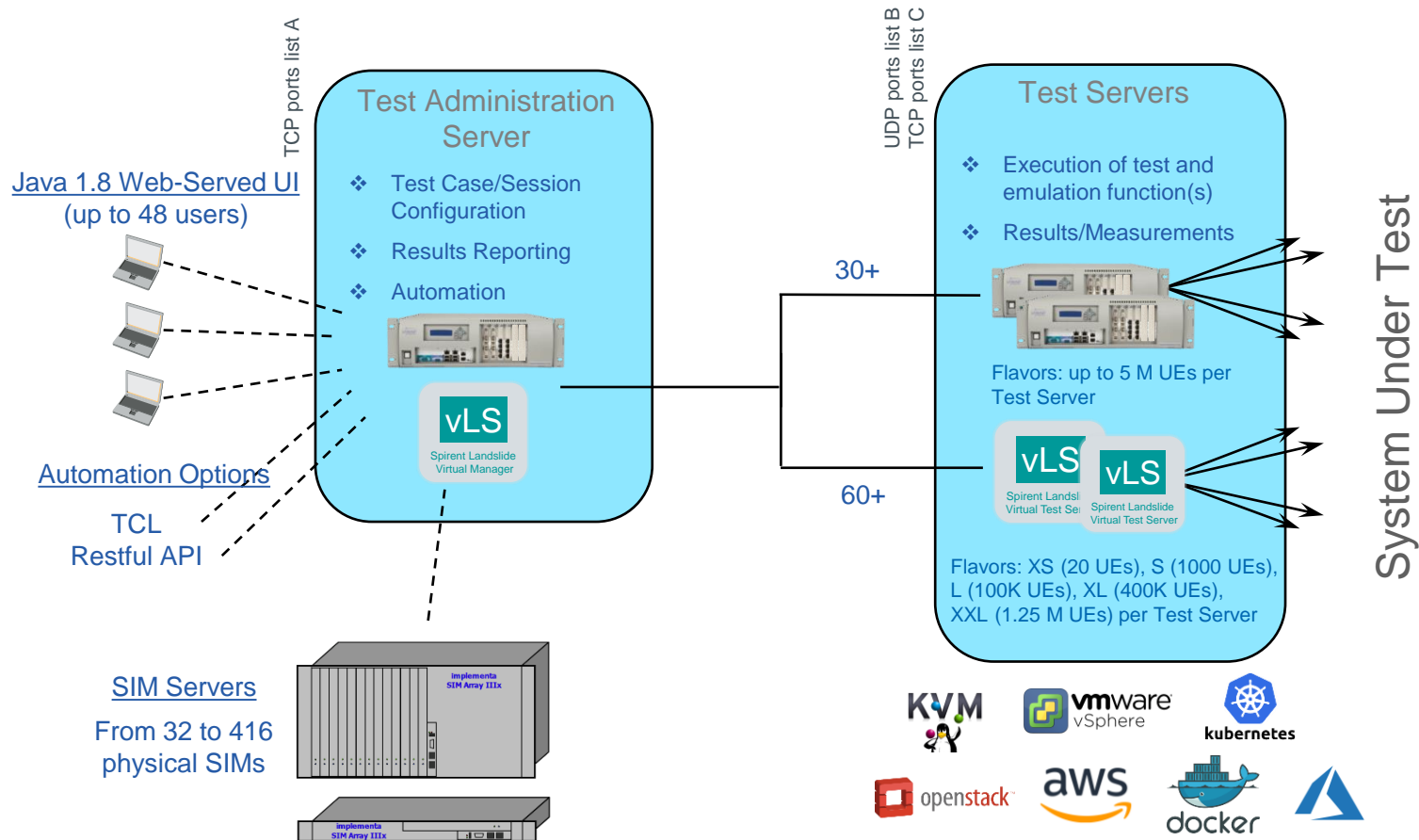
5G, LTE & Wi-Fi scenarios



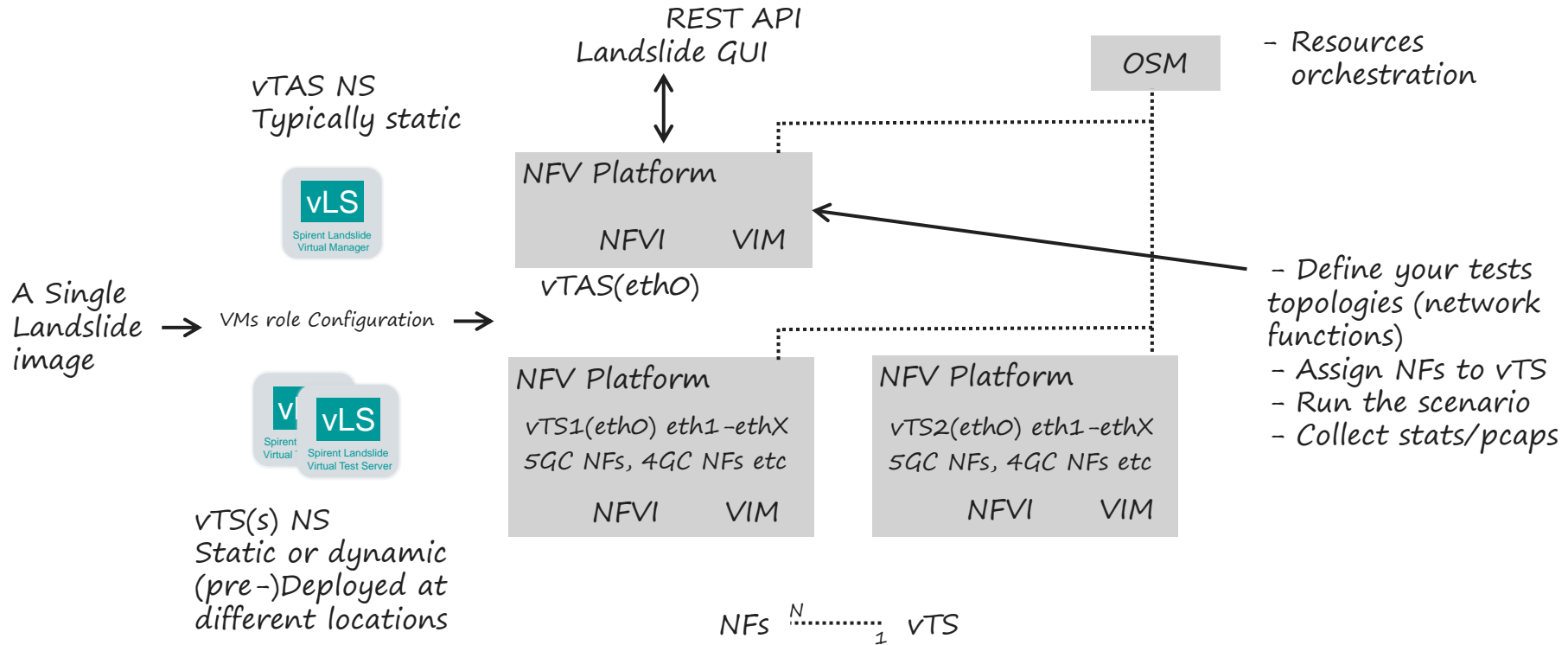
Landslide PNFs/VNFs/CNFs

(virtual) Test Servers – (v)TS
Active Test Agent(s)

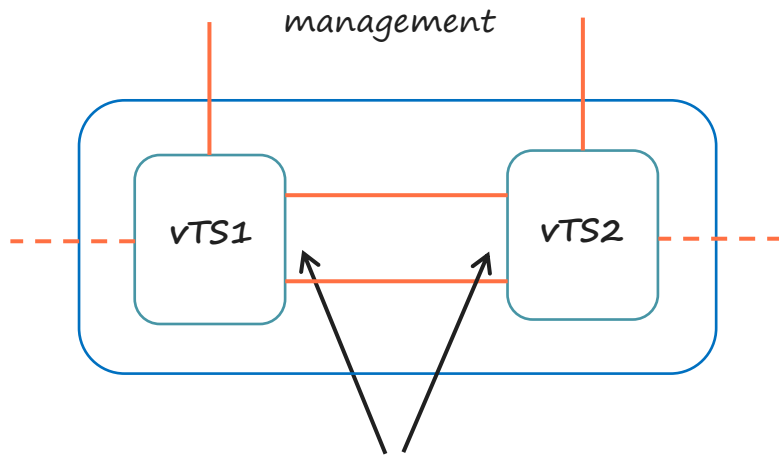
Landslide Platform Overview



Using Landslide with OSM



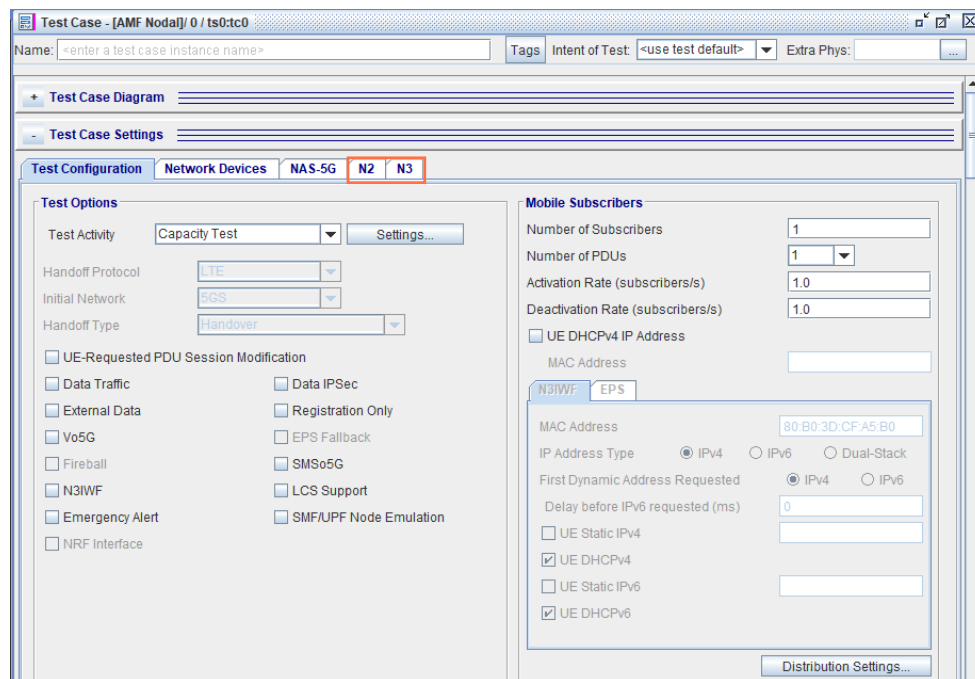
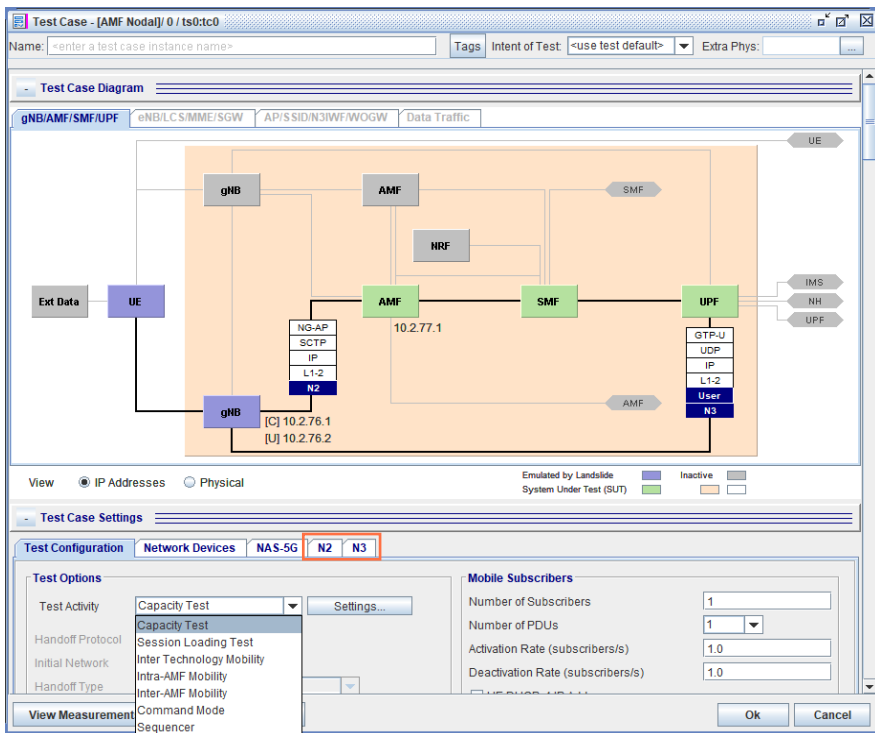
vTS NSD: back-to-back example



- DPDK support required (EPA (Enhanced Platform Awareness) or natively available to the guests)
- Port security disabled on Test ports is recommended for flexible IP configurations

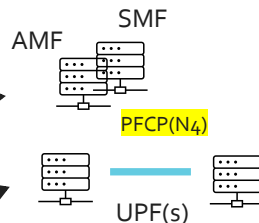
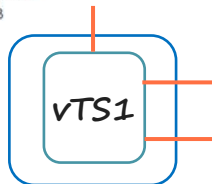
```
1 nsd-catalog:
2 nsd:
3   - constituent-vnfd:
4     - member-vnf-index: '1'
5       start-by-default: 'true'
6       vnfd-id-ref: landslidevTS_vnfd
7     - member-vnf-index: '2'
8       start-by-default: 'true'
9       vnfd-id-ref: landslidevTS_vnfd
10    description: NS Landslide B2B
11    id: NS_LandslideB2B_1
12    name: NS_LandslideB2B_1
13    short-name: NS_LandslideB2B_1
14    vendor: SPIRENT
15    logo: spirentlogo.png
16    version: '18.8'
17    vld:
18      - description: Mgmt VL
19        mgmt-network: 'true'
20        id: ccccc0
21        name: VL0
22        short-name: VL0
23        type: ELAN
24        vlm-network-name: management
25        vnfd-connection-point-ref:
26          - member-vnf-index-ref: '1'
27            vnfd-id-ref: landslidevTS_vnfd
28            vnfd-connection-point-ref: mgmt
29          - member-vnf-index-ref: '2'
30            vnfd-id-ref: landslidevTS_vnfd
31            vnfd-connection-point-ref: mgmt
32      - description: Data VL1
33        id: ccccc1
34        name: VL1
35        short-name: VL1
36        type: ELAN
37        vlm-network-name: spirent_test_network
38        vnfd-connection-point-ref:
39          - member-vnf-index-ref: '1'
40            vnfd-connection-point-ref: data1
41            vnfd-id-ref: landslidevTS_vnfd
42            ip-address: 192.168.1.100
43          - member-vnf-index-ref: '2'
44            vnfd-connection-point-ref: data1
45            vnfd-id-ref: landslidevTS_vnfd
46            ip-address: 192.168.1.105
47      - description: Data VL2
48        id: ccccc2
49        name: VL2
50        short-name: VL2
51        type: ELAN
52        vlm-network-name: spirent_test_network
53        vnfd-connection-point-ref:
54          - member-vnf-index-ref: '1'
55            vnfd-connection-point-ref: data2
56            vnfd-id-ref: landslidevTS_vnfd
57            ip-address: 192.168.1.110
58          - member-vnf-index-ref: '2'
59            vnfd-connection-point-ref: data2
60            vnfd-id-ref: landslidevTS_vnfd
61            ip-address: 192.168.1.115
62
```

vTS NSD: 5GC E2E signaling example



vTS NSD: 5GC E2E signaling example

```
1 nsd-catalog:
2 nsd:
3   - constituent-vnfd:
4     - member-vnfd-index: '1'
5       start-by-default: 'true'
6       vnfd-id-ref: landslidevTS_vnfd
7     description: NS Landslide B2B
8     id: NS_LandslideB2B
9     name: NS_LandslideB2B
10    short-name: NS_LandslideB2B
11    vendor: SPIRENT
12    logo: spirentlogo.png
13    version: '18.8'
14    vld:
15  - description: Mgmt VL
16  - description: Data n2
17    id: ccccl
18    name: VL1
19    short-name: VL1
20    type: ELAN
21    vim-network-name: n2
22    vnfd-connection-point-ref:
23      - member-vnfd-index-ref: '1'
24        vnfd-connection-point-ref: data1
25        vnfd-id-ref: landslidevTS_vnfd
26  - description: Data n3
27    id: ccccl2
28    name: VL2
29    short-name: VL2
30    type: ELAN
31    vim-network-name: n3
32    vnfd-connection-point-ref:
33      - member-vnfd-index-ref: '1'
34        vnfd-connection-point-ref: data2
35        vnfd-id-ref: landslidevTS_vnfd
```



No.	Time	Source	Destination	Protocol	Length	Info
7	2.999795	13.10.21.7	13.10.21.44	NGAP	106	NGSetupRequest
9	3.012997	13.10.21.7	13.10.21.7	NGAP	114	NGSetupResponse
13	5.499492	13.10.21.7	13.10.21.44	NGAP/NAS-5..	138	InitialUEMessage, Registration request
14	5.524862	13.10.21.7	13.10.21.7	NGAP/NAS-5..	162	DownlinkNASTransport, Authentication request
15	5.524942	13.10.21.7	13.10.21.44	NGAP/NAS-5..	146	UplinkNASTransport, Authentication response
16	5.550932	13.10.21.7	13.10.21.7	NGAP/NAS-5..	142	DownlinkNASTransport, Security mode command
17	5.550908	13.10.21.7	13.10.21.44	NGAP/NAS-5..	182	UplinkNASTransport, Security mode complete, Registration request
18	5.629445	13.10.21.7	13.10.21.7	NGAP	190	InitialContextSetupRequest
19	5.629555	13.10.21.7	13.10.21.44	NGAP	102	InitialContextSetupResponse
20	5.638901	13.10.21.7	13.10.21.7	NGAP/NAS-5..	162	DownlinkNASTransport, Registration accept
21	5.638928	13.10.21.7	13.10.21.44	NGAP	118	UERadioCapabilityInfoIndication
22	5.638939	13.10.21.7	13.10.21.44	NGAP/NAS-5..	118	UplinkNASTransport, Registration complete
24	7.499023	13.10.21.7	13.10.21.44	NGAP/NAS-5..	154	UplinkNASTransport, UL NAS transport, PDU session establishment request
25	7.613448	13.10.21.7	13.10.21.7	NGAP/NAS-5..	222	PDUResourceSetupRequest, DL NAS transport, PDU session establishment accept
26	7.633887	13.10.21.7	13.10.21.44	NGAP	122	PDUResourceSetupResponse

Test Session - 9: sms/AMF node

File Settings Logs Reports

Test Complete.

Overall State: COMPLETE

Session Builder Automation Control Pass/Fail Port Capture Reports Favorites Info Logs

Options... Filters... Enable Filtering Interval 5 of 5 Go to interval Go

Report View: [AMF Node] 0 / 1s0c0

Test Summary N2 SCTP gNB Control Node NGAP MM SM

Measurement	2	3	4	5	Current
Elapsed Time	30 Sec(s)	45 Sec(s)	1 Min(s) 0 Sec(s)	1 Min(s) 15 Sec(s)	1 Min(s) 17 Sec(s)
Actual Time	06/19 16:13:09	06/19 16:13:24	06/19 16:13:39	06/19 16:13:54	06/19 16:13:56
Authentication Requests	1	1	1	1	1
Authentication Responses	1	1	1	1	1
Authentication Rejects	0	0	0	0	0
Authentication Failures	0	0	0	0	0
Authentication Results	0	0	0	0	0
Registration Requests	1	1	1	1	1
Registration Accepts	1	1	1	1	1
Registration Completes	1	1	1	1	1
Registration Rejects	0	0	0	0	0
Service Requests	0	0	0	0	0
Service Accepts	0	0	0	0	0
Service Rejects	0	0	0	0	0
Security Mode Commands	1	1	1	1	1
Security Mode Completes	1	1	1	1	1
Security Mode Rejects	0	0	0	0	0
Identify Requests	0	0	0	0	0
Identify Responses	0	0	0	0	0
UE Initiated DeRegistration Requests	0	0	0	1	1
UE Initiated DeRegistration Accepts	0	0	0	1	1
UE Terminated DeRegistration Requests	0	0	0	0	0
UE Terminated DeRegistration Accepts	0	0	0	0	0
Uplink Nas Transport	1	1	1	1	1
Downlink Nas Transport	1	1	1	1	1
Registration Requests With SMS	0	0	0	0	0
Registration Requests SMS Denied	0	0	0	0	0

Abort Stop Run Save Close

vTS NSD: From Lab to Live



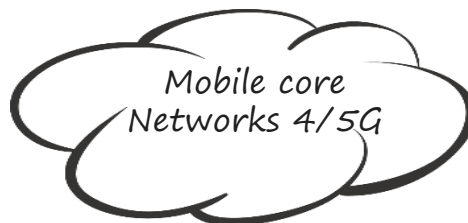
Scenarios portability, DevOps . . .



Service Assurance in Production environment
VisionWorks Mobile Infrastructure SA - MSA



Test lab
Landslide



Active Test Agent(s) - vTS
Landslide PNFs/VNFs/CNFs



OSM



Staging environment
Landslide

Tentative Next Steps

- Landslide vTS:
 - Adding Day-X scripts
 - CNFs
 - Adding Landslide vTS NS testing to a fully automated 5GC workflow
 - Multi-VIM vTS NS
 - Using other VIMs (VMware, AWS etc)
- Nice to have in OSM:
 - Ability to specify predefined flavor names in OSM descriptors
 - Not sure if use_existing_flavors really supported
 - Maybe adding DPDK-related VFND examples to OSM descriptors tutorials



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