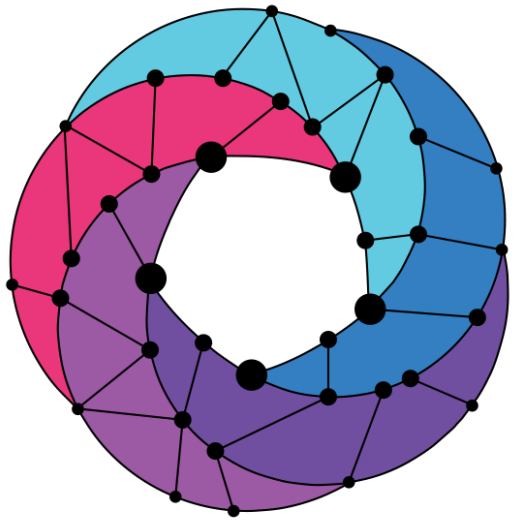

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MANO

DevOps in Service Chains and 5G Network Slices

ETSI OSM PoC #1

Telenor, Arctos Labs, Intel, Netrounds, RIFT.io

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ESTI OSM PoC #1 Participants

- Service Provider sponsor:

telenor

- Vendors involved:

intel netrounds

RIFT.io™

- Open Source MANO Release ONE:

Open Source MANO

- System Integrators involved:

ARCTOS LABS

PoC Drivers

Ensuring good **customer experience is a top** priority for service providers

But - networks are becoming **more complex** with **more frequent changes**

"How do you ensure the service you are delivering is meeting the quality that the customer expects?"

- Heavy Reading, recent OSS/BSS Transformation article

PoC Drivers

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1. **Design time:** End-to-end validation required when building new service chains
   - **Prior** to publishing NSDs to the catalog
2. **Run time**
   1. The chain must be activation tested as part of the fulfilment process.
   2. Prior to customers are on-boarded
   3. The chain must be constantly monitored that it provides its functionality according to SLAs
      1. Prior to customers detecting issues
3. **Frequent changes** will occur to service chains during the life-time
   1. No time to manually test and validate that changes will not break anything
   2. Testing has to be programmable and automatable
4. **Assurance capabilities must be designed** into the lifecycle management of every service chain

PoC Overview – What If You Could?

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Validate the SLA

- At time of deployment
- Before handing over to customer
- Deliver birth certificates

Discover Issues Earlier

- Get insight of service quality from end-users' view
- Get guidance when prioritizing issues

Resolve Problems Faster

- Understand at which layer problems occur
- Understand which parts of the network are affected

Collecting counters from your infrastructure will not solve the above

PoC Overview – Active Testing Enables

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Validate the SLA

- Generate real world traffic – before end users
- Deliver birth certificates to stakeholders

Discover Issues Earlier

- Generate multi-layer traffic from end user locations
- Monitor active traffic with second resolution

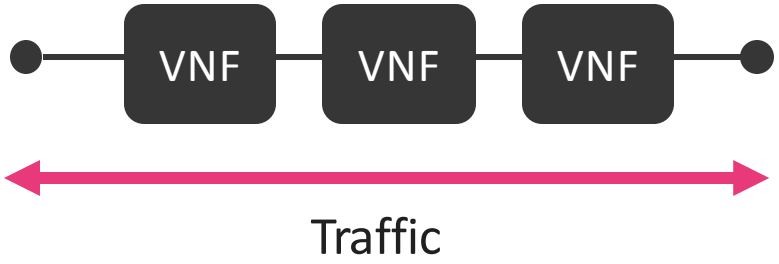
Resolve Problems Faster

- Use remote testing capabilities
- Automate advanced test scenarios
- Test across layers, services and domains

Active test traffic is required to achieve the above

Testing and Assuring the Network Service

- What is service assurance?



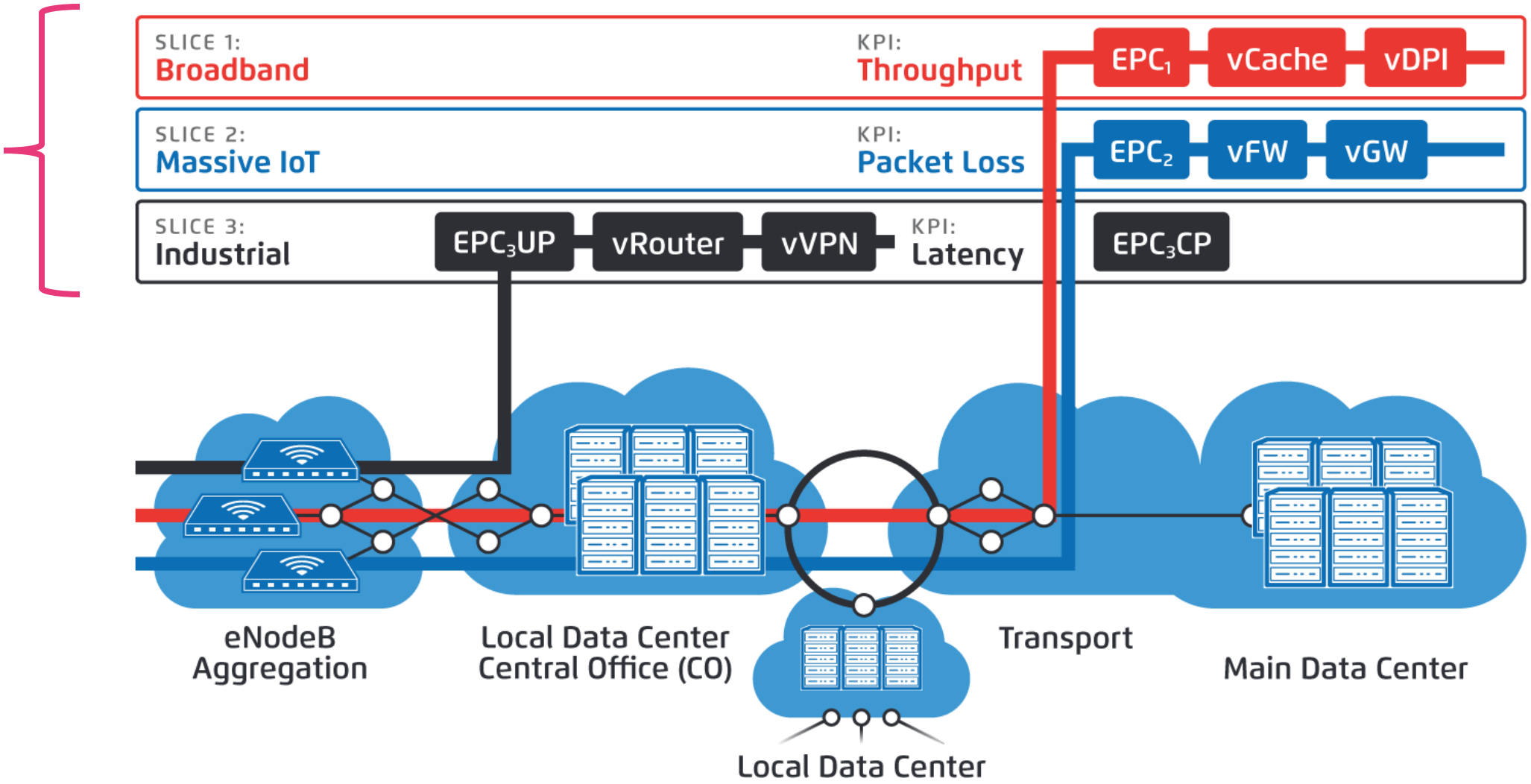
Functionality, characteristics as seen by client

Only aggregating NFVI KPIs from the VNFs to the Network Service does not tell how the service is working

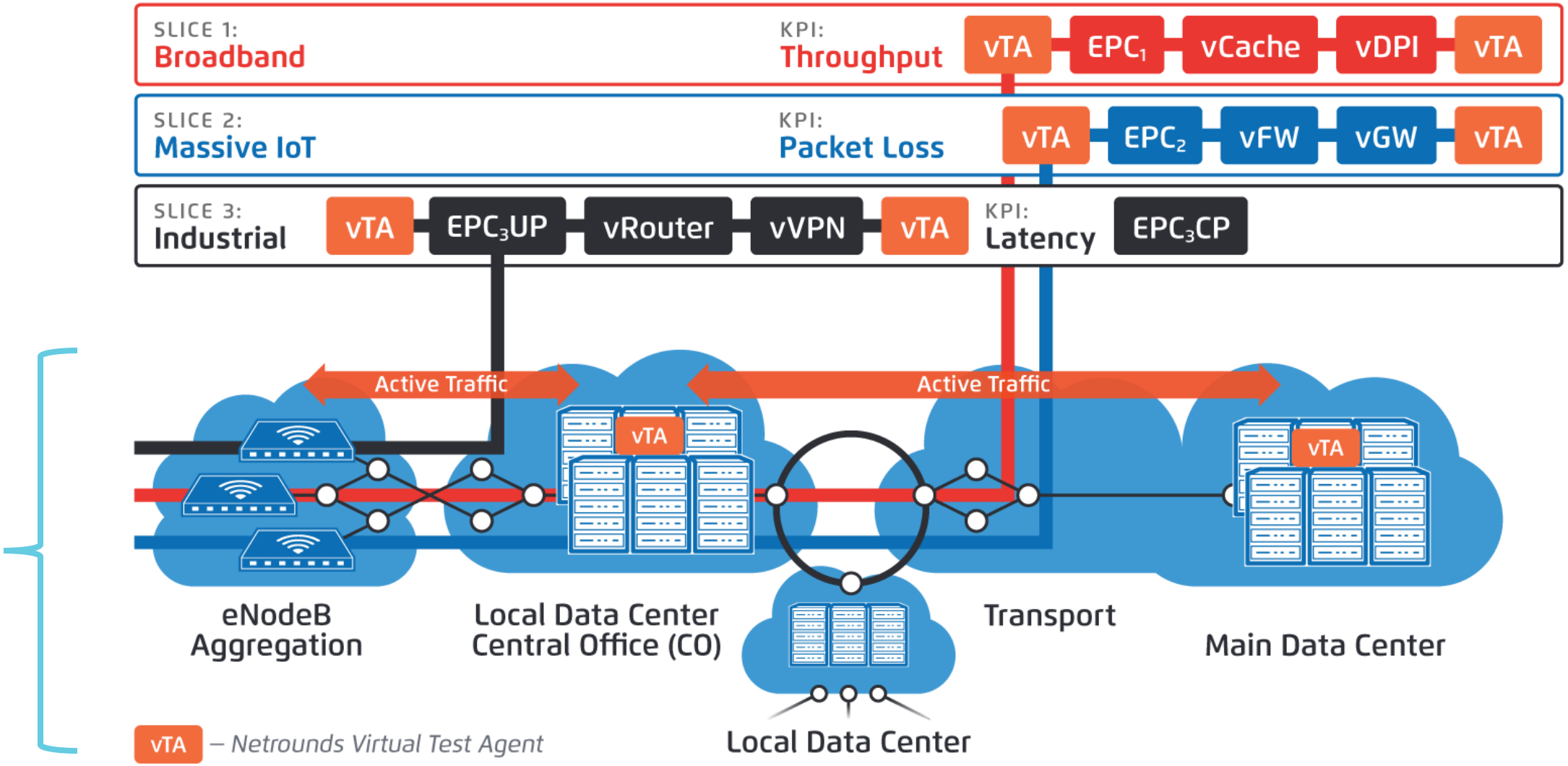
- No traffic before customers are using it, too late
- No service KPIs

→ Active tests at the service layer

PoC Domain: Slicing to Meet QoS Requirements



Assuring Expected QoS Levels with Active Measurements



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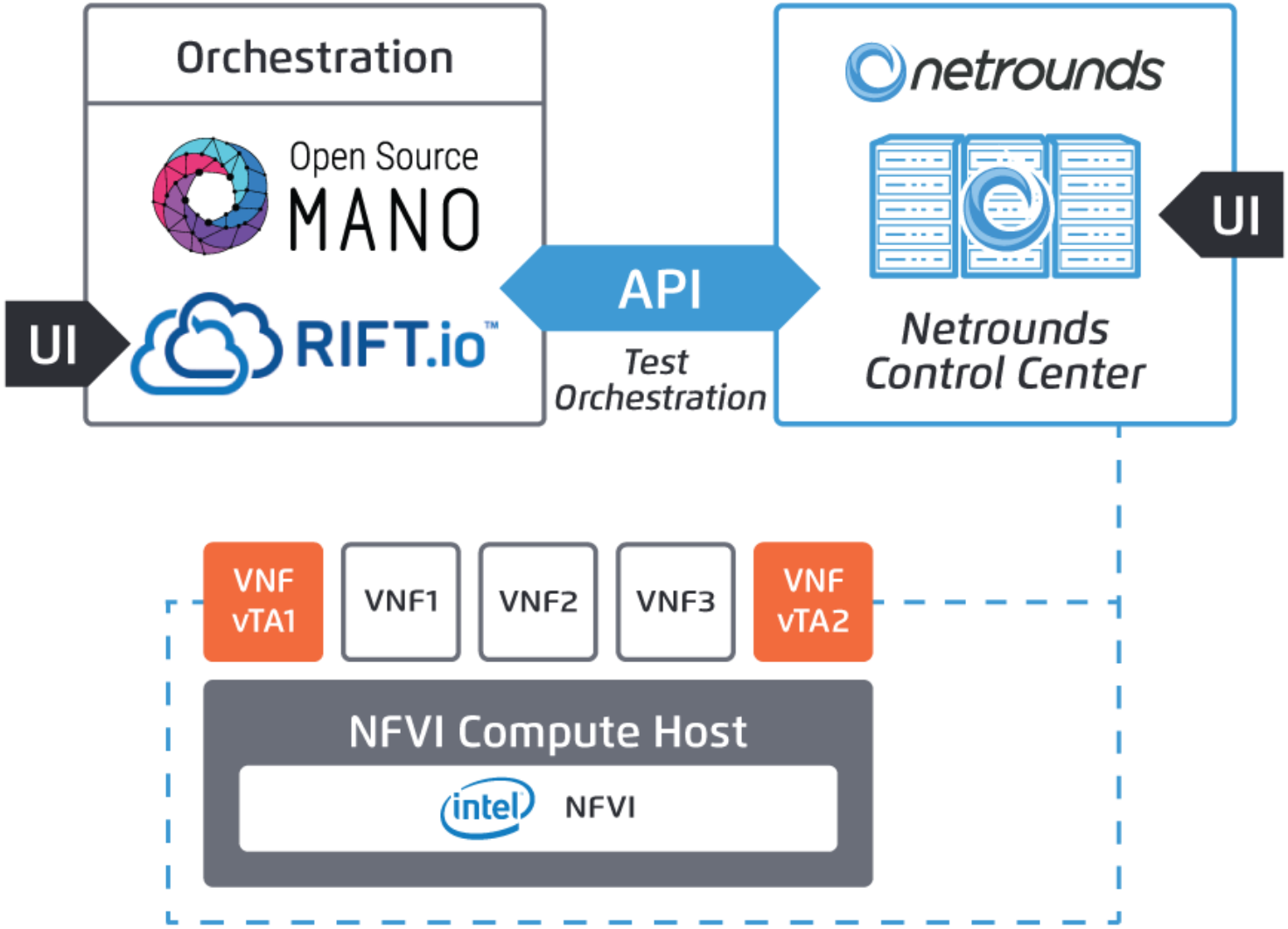
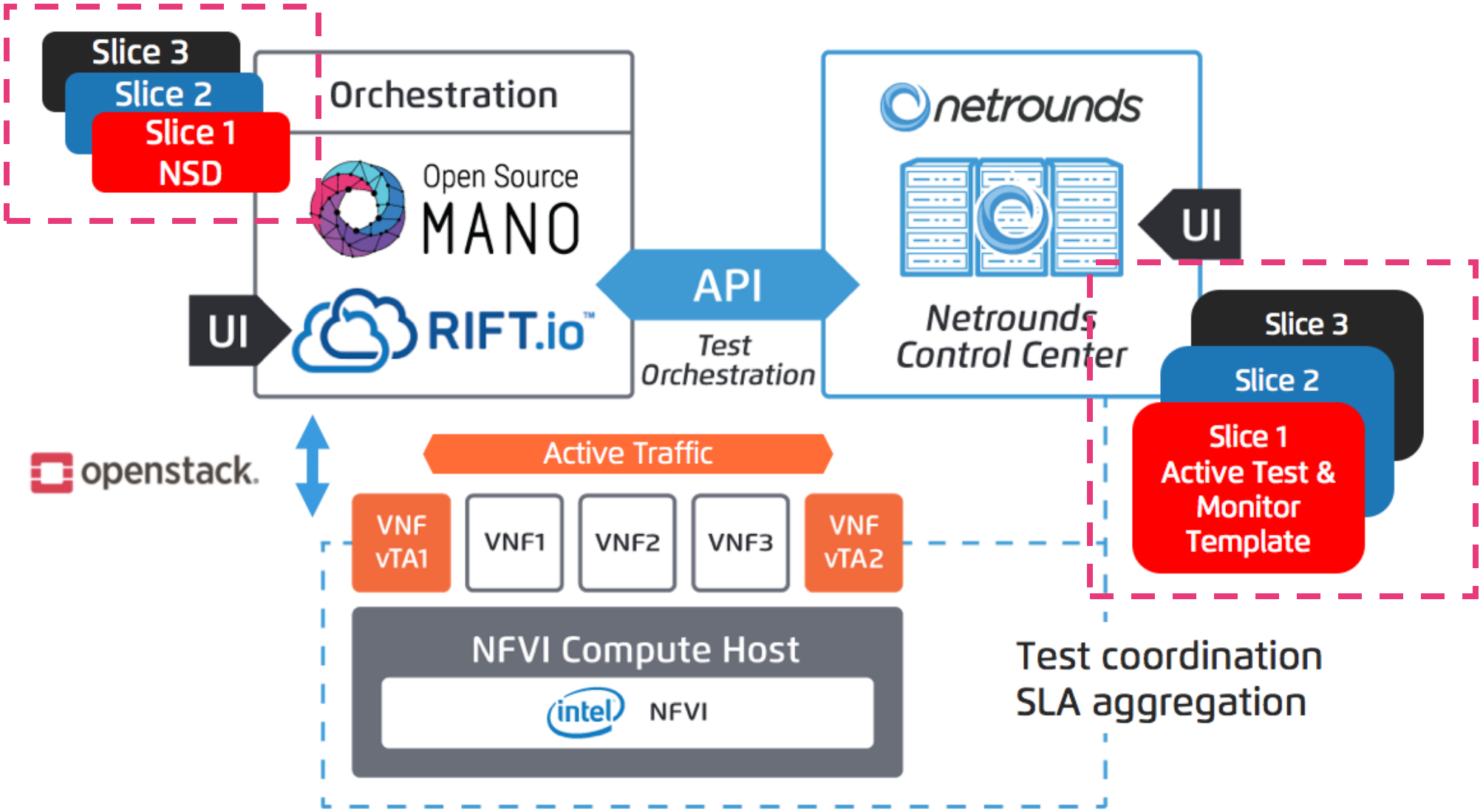
PoC Architecture and Demo Flow

PoC Architecture

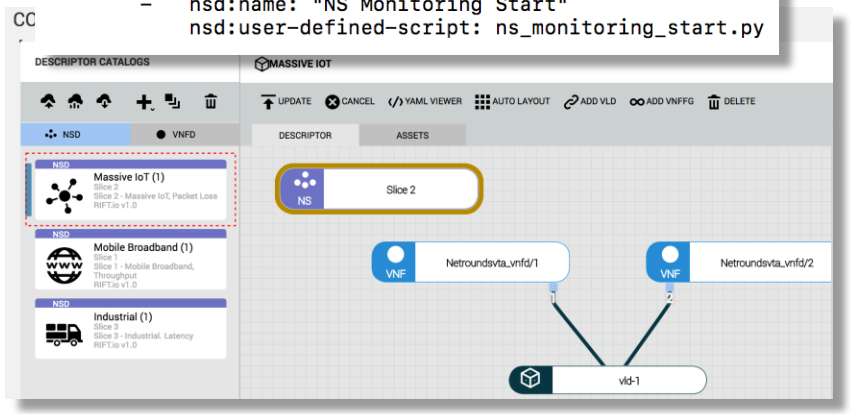


PoC Architecture – Key Details



NSD Design

```
nsd:nsd-catalog:
    nsd:nsd:
        nsd:constituent-vnfd:
        -   nsd:member-vnf-index: '1'
            nsd:vnfd-id-ref: Netroundsvta_vnfd
        -   nsd:member-vnf-index: '2'
            nsd:vnfd-id-ref: vRouter_vnfd
...
        -   nsd:member-vnf-index: '5'
            nsd:vnfd-id-ref: Netroundsvta_vnfd

        nsd:id: Service_Slice_nsd

        nsd:vld:
...



        nsd:initial-config-primitive:
        -   nsd:name: "NS Activation Test"
        nsd:user-defined-script: ns_activation_test.py

        nsd:service-primitive:
        -   nsd:name: "NS Monitoring Start"
            nsd:user-defined-script: ns_monitoring_start.py
```

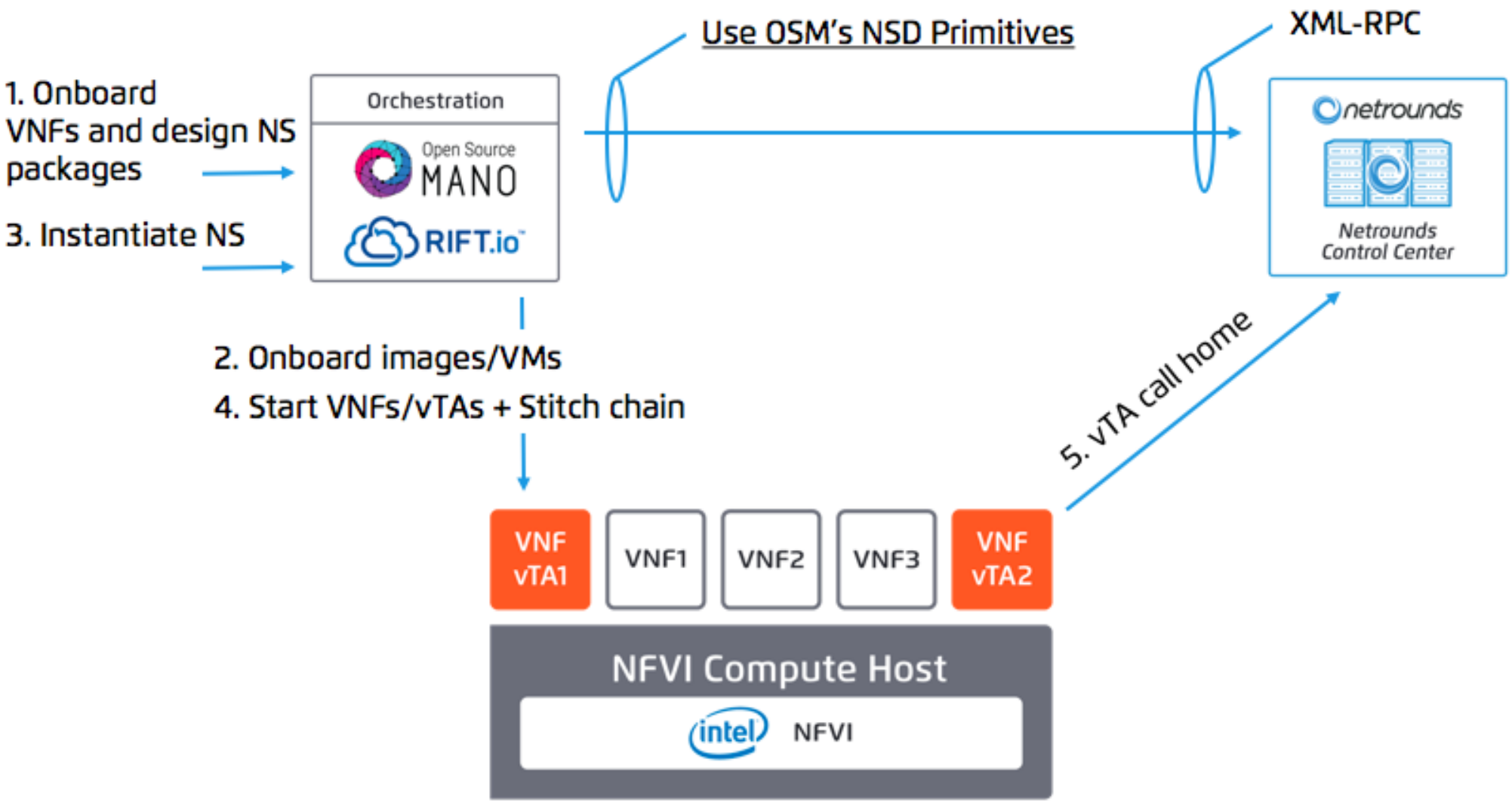


Orchestrate Virtual Test Agents as part of NS orchestration

Active test traffic part of NSD Instantiation

Continuous NS monitoring after instantiation

PoC Demo Flow



Slice Instantiation

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Open Source MANO | ACCOUNTS | LAUNCHPAD | CONFIG | CATALOG

DASHBOARD
INSTANTIATE
SSH KEYS

LAUNCHPAD: ATE

SELECT DESCRIPTOR

Mobile Broadband
Slice 1
RIFT.io / 1.0

Slice 1 - Mobile Broadband, Throughput

VNFDs: 3 VLDs: 1

Massive IoT
Slice 2
RIFT.io / 1.0

Slice 2 - Massive IoT, Packet Loss

LAUNCHPAD

NETWORK SERVICES

TOTAL: 3 RUNNING: 3 FAILED: 0 SCALING OUT: 0 SCALING IN: 0 INITIALIZING: 0

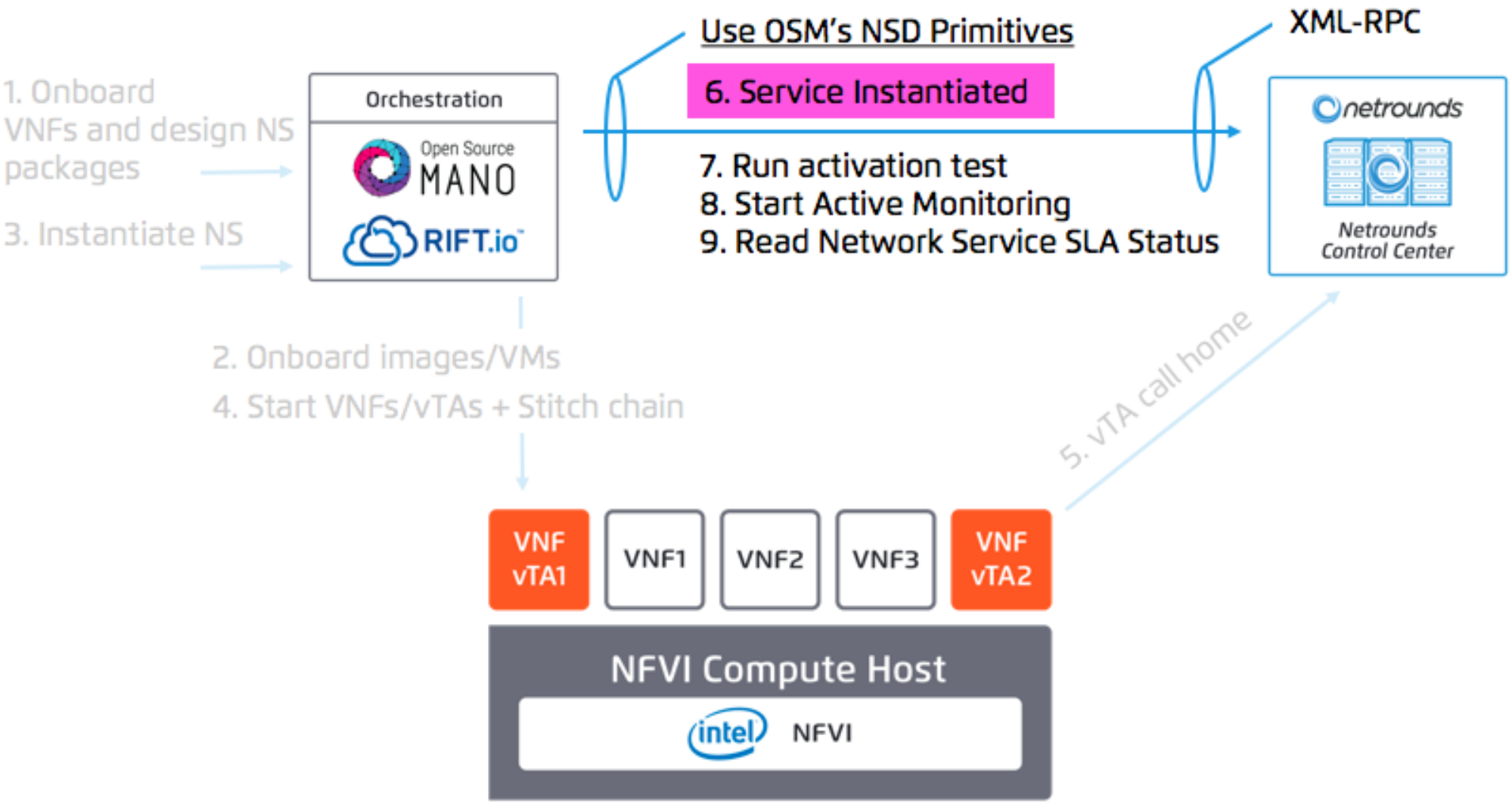
Instantiate Service

NS NAME	NSD	STATUS	UPTIME	
slice3	Industrial	Active	3h:9m	
slice1	Mobile Broadban...	Active	19m:35s	

SLICE 2 DESCRIPTOR PREVIEW


```
        data-type: "INTEGER"
        name: "Rate"
        mandatory: "true"
      -
        default-value: "127"
        data-type: "INTEGER"
        name: "Monitoring Template ID"
        mandatory: "true"
    user-defined-script: "slice2_monitoring_start.py"
    name: "Slice2 Monitoring Start"
  constituent-vnfd:
    -
      member-vnf-index: 1
      start-by-default: "true"
      vnfd-id-ref: "Netroundsvta_vnfd"
      name: "Netroundsvta_vnfd"
      vnf-name: "Netroundsvta_vnfd"
    -
      member-vnf-index: 2
      start-by-default: "true"
      vnfd-id-ref: "Netroundsvta_vnfd"
      name: "Netroundsvta_vnfd"
      vnf-name: "Netroundsvta_vnfd"
    -
      member-vnf-index: 3
      start-by-default: "true"
      vnfd-id-ref: "monitor_vnfd"
      name: "monitor_vnfd"
      vnf-name: "monitor_vnfd"
  description: "Slice  2 - Massive IoT, Packet Loss"
  vld:
    -
      id: "vld-1"
      name: "vld-1"
      vnfd-connection-point-ref:
        -
          member-vnf-index-ref: 1
          vnfd-id-ref: "Netroundsvta_vnfd"
```

PoC Demo Flow



Activation Testing Execution

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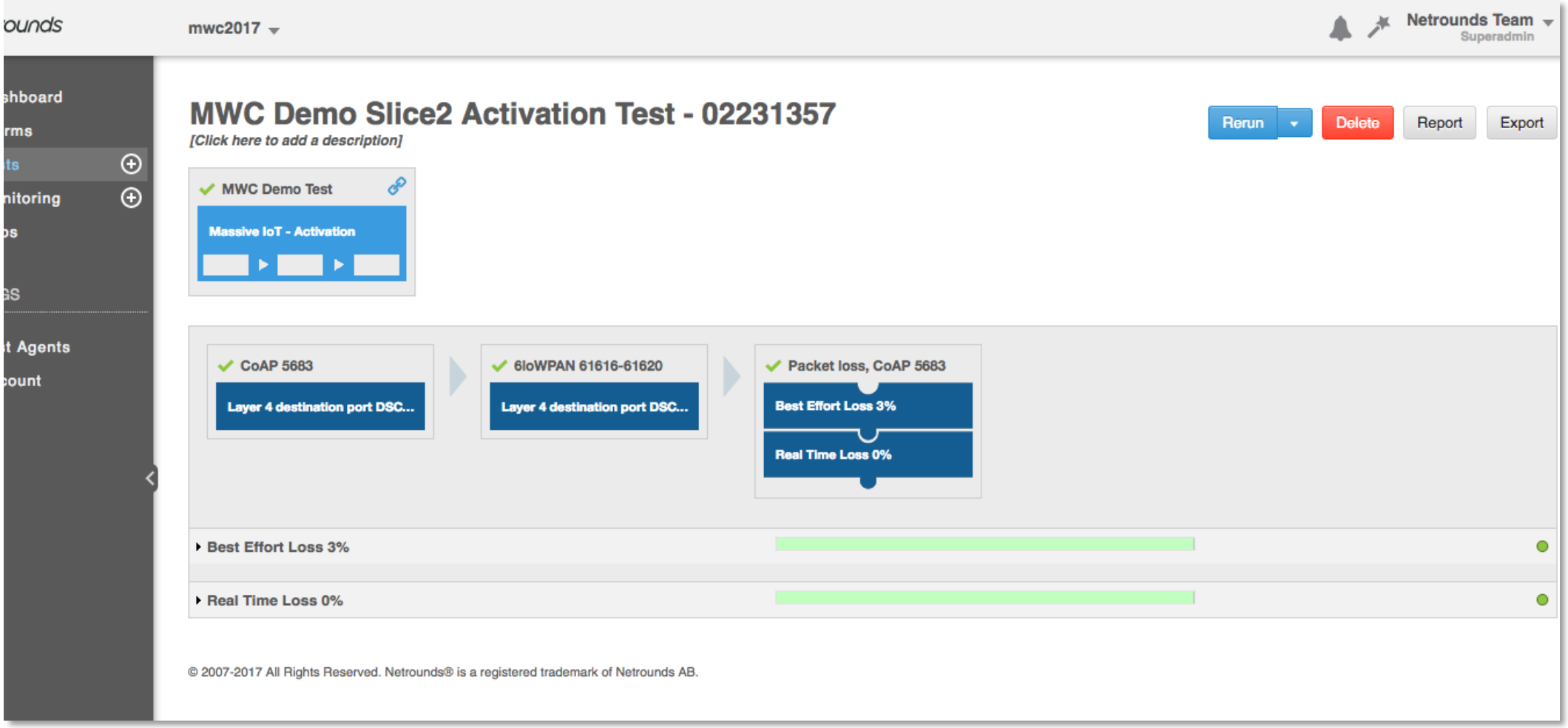

Tests and Monitoring

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Ongoing Monitoring

Monitoring

Show all

History interval: 15m 1h 6h 24h 1w 4w 1y

Filter: All Running Stopped Tags Clear

Name	Tags	14:38:50	14:53:50	SLA	Share
MWC Demo Monitoring Slice1 - 02221317					
MWC Demo Monitoring Slice3 - 02221351					

Page 1 of 1

Errored Seconds (ES): 0% 0.1% 1% 10% 50% No data

Tests

Show all

Name	Start Time	Share
MWC Demo Slice3 Activation Test - 02221344	2017-02-22 14:44:17	
MWC Demo Slice1 Activation Test - 02221313	2017-02-22 14:13:57	

Passed Activation Tests

Detailed Activation Test Reports

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Secure https://app.netrounds.com/mwc2017/testing/312791/

netrounds mwc2017

Dashboard
Alarms
Tests
Monitoring
Apps

SETTINGS

Test Agents
Account

MWC Demo Slice1 Activation Test - 0

[Click here to add a description]

MWC Demo Test

Mobile Broadband - Activation

MTU Test

Path MTU discovery

DNS & HTTP

DNS

HTTP

2017-02-16 22:15:15: 1450 bytes MTU configured on server.
2017-02-16 22:15:15: 1450 bytes MTU configured on client.
2017-02-16 22:15:17: Measured 1450 bytes path MTU in the client->server direction
2017-02-16 22:15:17: Passed: 1450 bytes PMTU measured

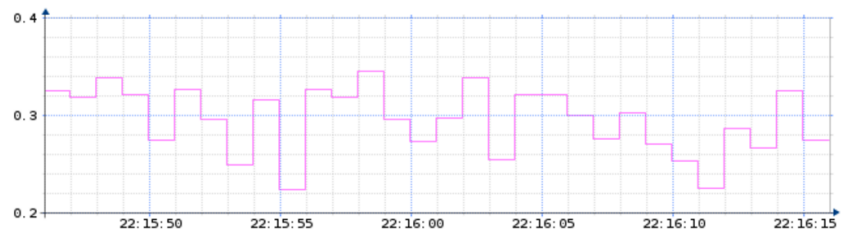
tps://app.netrounds.com/mwc2017/testing/312791/report_builder/

Errored Seconds (ES): 0% 0.1% 1% 10% 50% No data

Resp. time min (ms)	Resp. time avg (ms)	Resp. time max (ms)	SLA	ES total	ES timeout	ES response
0.22	0.3	0.35	30s (100%)	0s (0%)	0s (0%)	0s (0%)
10.20.30.2 - mn__Netroundsvta_vnfd__2:eth1 (IPv4) 2017-02-16 22:15:46 2017-02-16 22:16:16						

Graphs

10.20.30.2 - mn__Netroundsvta_vnfd__2:eth1 (IPv4)



1.2.2 HTTP

Test agents

Clients: mn__Netroundsvta_vnfd__2:eth1 (IPv4)

General

URL: https://www.mobileworldcongress.com

Time between requests (s): 1.0

Thresholds for errored seconds (ES)

Ongoing Active Monitoring

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mwc2017

Monitoring

History interval: 15m 1h 6h 24h 1w 4w 1y

Filter: All Running Stopped Any Creator

Name	Tags	15:04:32	15:19:3
MWC Demo Monitoring Slice1 - 02230840			
MWC Demo Monitoring Slice3 - 02230858			
MWC Demo Monitoring Slice2 - 02231417			

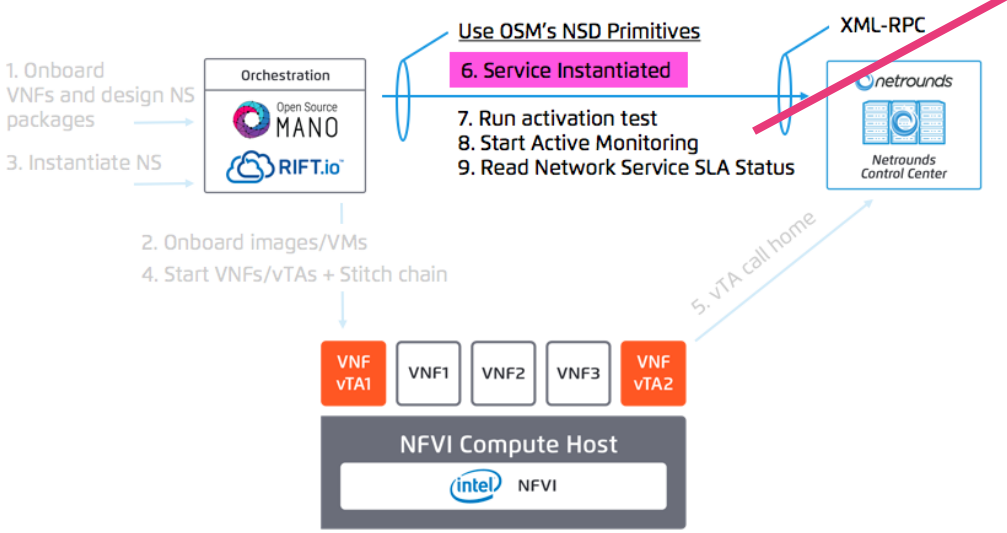
Page 1 of 1

Errored Seconds (ES): 0% 0.1%

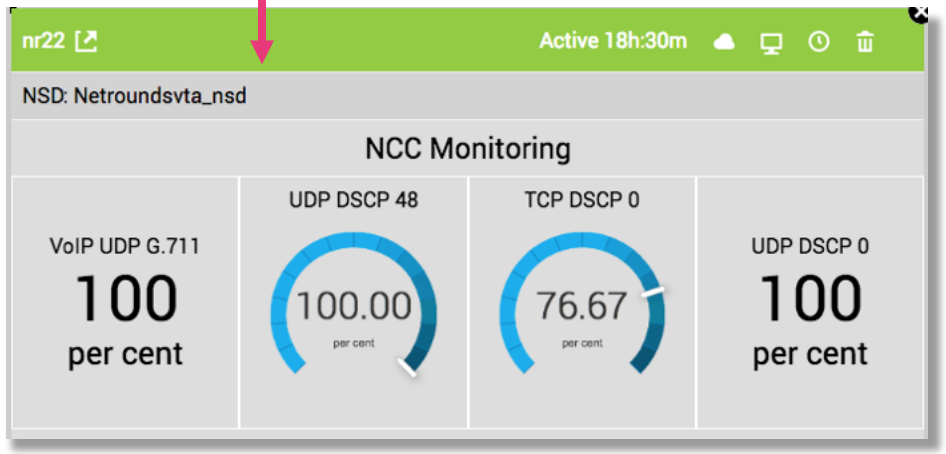
Tests

Name	Start Time
MWC Demo Slice2 Activation Test - 02231357	2017-02-23 14:57:35
MWC Demo Slice3 Activation Test - 02230855	2017-02-23 09:55:36

NS Monitoring




```
vnfd:monitoring-param:
    ....
-   vnfd:name: "VoIP UDP G.711"
    vnfd:description: "VoIP UDP G.711 Stats"
    vnfd:http-endpoint-ref: "monitoring/results"
    vnfd:json-query-method: "NAMEKEY"
    vnfd:numeric-constraints:
        vnfd:min-value: 0
        vnfd:max-value: 100
    vnfd:units: "per cent"
    vnfd:widget-type: "COUNTER"
    vnfd:id: "3"
    vnfd:value-type: "DECIMAL"
    vnfd:group-tag: "NCC Monitoring"
```



- Needed "proxy" VNF in order to represent NS
- as first class citizen.
  NS can not have stand-alone monitoring parameters.

OSM Launchpad: Real-time SLAs

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Key PoC Takeaways

Key PoC Takeaways

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1. 5G network slice deployments require different, critical SLAs that must be met depending on slice use case

2. Active service testing and monitoring that is orchestrated, fully automated and provides DevOps flexibility is needed

Arctos Labs, Netrounds and RIFT.io have developed **ETSI OSM PoC #1** with Telenor on Intel Architecture to showcase solution.

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Thank you!

Please feel free to reach out to PoC team at kaela.loffler@netrounds.com should you have any further questions.