

Open Source
MANO

Hackfest #13

On-boarding Magma 1.7 5G Core With OSM

[ACRL@SUNYPOLY Team:](#)

Hisham Kholidy, Michael Stein, Mohammed Abuzamak, Wendell Balbuena, and
Yusuf Elazzazi



ACRL@SUNYPOLY Team Members



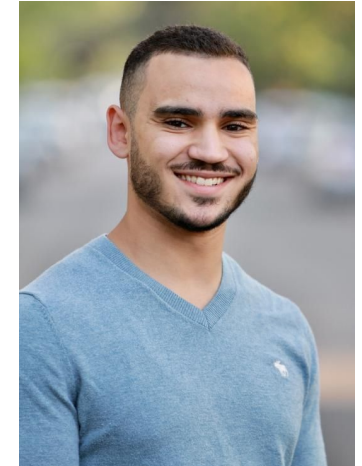
Hisham Kholidy, Ph.D.

Assistant Prof. State University of New York Polytechnic Institute (SUNY Poly). Director of the ACRL lab.



Michael Stein

MS student at SUNY POLY



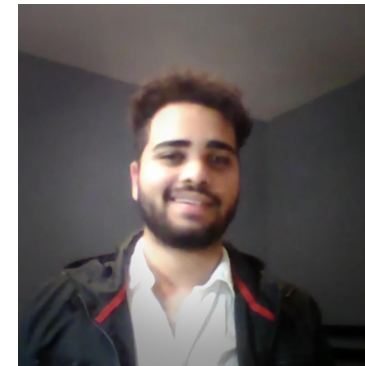
Yusuf Elazzazi

BS student at Buffalo University



Mohammed Abuzamak

BS student at SUNY POLY



Wendell Balbuena

BS student at SUNY POLY

Task Progress

Task	Status	Timeline		
		Tuesday 6/14	Wednesday 6/15	Thursday 6/16
1. On-board Magma ORC with OSM.	Done	<div></div>		
2. On-board Magma AGW with OSM.	Done	<div></div>		
3. On-board SRS-LTE simulators for gnb and UE.	Done	<div></div>		
4. Connect it all together to see traffic in Magma Orchestrator – OSM day 2 action.	Done	<div></div>		
5. Implementing 2 additional lifecycle actions (disconnect / connect simulators).	Done	<div></div>		
6. Implementing 2 additional lifecycle actions (connect / disconnect AGW to/from ORC).	Done	<div></div>		
7. Additional Developments (Extra tasks)	Done	<div></div>		

Magma Orchestrator GUI

```
*** System restart required ***
Last login: Tue Jun 14 20:19:20 2022 from 69.201.90.222
ubuntu@ip-192-168-72-101:~$ osm ns-action magma_orc_cnf_ns \
> --vnf_name magma_orc_cnf \
> --kdu_name magma-orc-kdu \
> --action_name get-admin-credentials
fefaba38-a457-4362-8435-6dadd54791d
ubuntu@ip-192-168-72-101:~$
```

Credentials 1

```
ubuntu@ip-192-168-72-101:~$ osm ns-op-show fefaba38-a457-4362-8435-6dadd54791d
+-----+-----+
| field | value |
+-----+-----+
| _id   | "fefaba38-a457-4362-8435-6dadd54791d" |
| id    | "fefaba38-a457-4362-8435-6dadd54791d" |
| operationState | "COMPLETED" |
| queuePosition | 0 |
| stage | "" |
| errorMessage | "" |
| detailedStatus | null |
| statusEnteredTime | 1655242562.2178833 |
| nsInstanceId | "1b908761-3cd3-4b0a-a2f1-d35f4c2327c6" |
| lcmOperationType | "action" |
| startTime | 1655242550.7729108 |
| isAutomaticInvocation | false |
| operationParams | {
|   "member_vnf_index": "magma_orc_cnf",
|   "kdu_name": "magma-orc-kdu",
|   "primitive": "get-admin-credentials",
|   "primitive_params": {},
|   "lcmOperationType": "action",
|   "nsInstanceId": "1b908761-3cd3-4b0a-a2f1-d35f4c2327c6"
| }
| isCancelPending | false |
| links | {
```

Credentials 2 (top)

Magma Orchestrator GUI

```
isCancelPending links
_admin
detailed-status

"primitive_params": {},
"lcmOperationType": "action",
"nsInstanceId": "1b908761-3cd3-4b0a-a2f1-d35f4c2327c6"
{
  "self": "/osm/ns lcm/v1/ns lcm_op_occs/fe faba38-a457-4362-8435-6daddd54791d",
  "nsInstance": "/osm/ns lcm/v1/ns_instances/1b908761-3cd3-4b0a-a2f1-d35f4c2327c6"
}
{
  "created": 1655242550.7729445,
  "modified": 1655242562.2178855,
  "projects_read": [
    "16562999a42241cb98bb04bd7f8d88b8"
  ],
  "projects_write": [
    "16562999a42241cb98bb04bd7f8d88b8"
  ],
  "worker": "e9dd4dd0f0f1"
}
{
  "Code": "0",
  "admin-password": "YDbwkasx2SsE",
  "admin-username": "admin@team7.osmhackfest.com"
}
```

Credentials 2 (bottom)

team7 - Google Drive × Magma × + Credentials 3

← → ↺ 🏠 🔒 🔑 <https://master.nms.team7.osmhackfest.com/user/login?to=%2F>

Kali Linux Kali Tools Kali Docs Kali Forums Kali NetHunter Exploit-DB Google Hacking DB OffSec

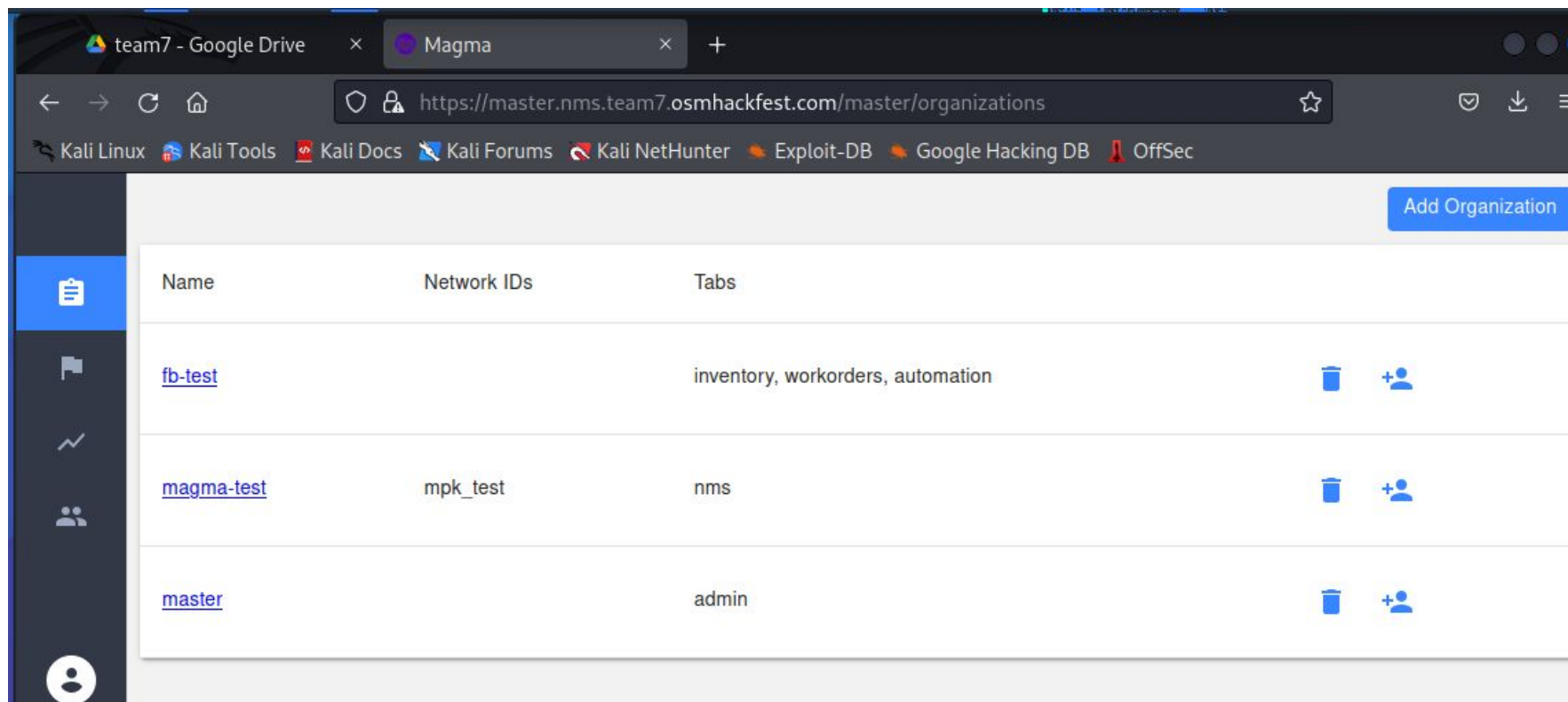
Magma

Email

Password

Login

Magma Orchestrator GUI



We have now accessed the web portal

Configuring Magma Access Gateway

[magma](#)

srs-lte

nms

Magma Agw 2

Gateway ID

magmaagw2

Hardware UUID

d7c91130-c8aa-4a0c-99d0-3fa891551781

Version

1.7.0-1648117787-73e61141

<div>Health</div> <div>● Good</div>	<div>Last Check in</div> <div>6/16/2022, 12:17:22 PM</div>	<div>CPU Usage</div> <div>Unknown</div>
<div>Event Aggregation</div> <div>● Enabled</div>	<div>Log Aggregation</div> <div>● Enabled</div>	<div>CPE Monitoring</div> <div>● Disabled</div>

CMO 1

CMO 2

CMO 3

Configuring Magma Orchestrator

⚙️ Subscribers Export

🔍 Search IMSI00101123456 ✕

Name	IMSI	Service	Current Usage	Daily Average	Last Reported Time	Actions
IMSI722170000000001	IMSI722170000000001	ACTIVE	0	0	-	⋮
IMSI722170000000002	IMSI722170000000002	ACTIVE	0	0	-	⋮
IMSI722170000000003	IMSI722170000000003	ACTIVE	0	0	-	⋮
IMSI722170000000004	IMSI722170000000004	ACTIVE	0	0	-	⋮
IMSI722170000000005	IMSI722170000000005	ACTIVE	0	0	-	⋮
IMSI722170000000006	IMSI722170000000006	ACTIVE	0	0	-	⋮
IMSI722170000000007	IMSI722170000000007	ACTIVE	0	0	-	⋮
IMSI722170000000008	IMSI722170000000008	ACTIVE	0	0	-	⋮
IMSI722170000000009	IMSI722170000000009	ACTIVE	0	0	-	⋮
IMSI722170000000010	IMSI722170000000010	ACTIVE	0	0	-	⋮

The subscribers from the given CSV in Magma Orchestrator

Magma AGW PNF and NS Packages

```
(kali㉿kali)-[~]
$ scp -i team7.pem Downloads/pdu.yaml ubuntu@52.16.198.71:/home/ubuntu
pdu.yaml                                100% 296    2.6KB/s   00:00

(kali㉿kali)-[~]
$ scp -i team7.pem Downloads/magma_agw_ns.tar.gz ubuntu@52.16.198.71:/home/
ubuntu
magma_agw_ns.tar.gz                    100% 692    5.9KB/s   00:00

(kali㉿kali)-[~]
$ scp -i team7.pem Downloads/magma_agw_pnf.tar.gz ubuntu@52.16.198.71:/home
/ubuntu
magma_agw_pnf.tar.gz                  100% 615    5.6KB/s   00:00

(kali㉿kali)-[~]
$
```

Packages procured
using SCP from local
host

```
ubuntu@ip-192-168-72-101:~$ osm nfpkg-create magma_agw_pnf.tar.gz
7c921df5-7255-4c80-b472-6239a93b5fa0
ubuntu@ip-192-168-72-101:~$ osm nspkg-create magma_agw_ns.tar.gz
ef821665-e3ad-4385-9ac7-c79e2fc336d7
ubuntu@ip-192-168-72-101:~$
```

PNF and NS
package creation

PDU Descriptor File Creation

```
File Actions Edit View Help
name: MagmaAGW
description: Magma Access GW
type: gateway
vim_accounts: [ <VI-MID> ]
shared: false
interfaces:
- name: eth0
  ip-address: <Magma AGW SGi IP>
  mgmt: true
- name: eth1
  ip-address: <Magma AGW S1 IP>
  mgmt: false
```

This is what the default configuration of the PDU.yaml file looks like

```
File Actions Edit View Help
name: MagmaAGW
description: Magma Access GW
type: gateway
vim_accounts: dd1ede15-6a45-486a-84a9-752f88602f5f
shared: false
interfaces:
- name: eth0
  ip-address: 192.168.94.115
  mgmt: true
- name: eth1
  ip-address: 192.168.91.95
  mgmt: false
```

We changed the values for the VIM ID, and Interfaces IPs

```
ubuntu@ip-192-168-72-101:~$ vim pdu.yaml
ubuntu@ip-192-168-72-101:~$ osm pdu-create --descriptor_file pdu.yaml
32fe2ba1-c854-4ca0-aec6-cb4bb7473c99
ubuntu@ip-192-168-72-101:~$
```

Descriptor file created

Onboarding the PNF into OSM

```
ubuntu@ip-192-168-72-101:~$ osm ns-create --ns_name magma_agw_ns \  
> --nsd_name magma_agw_ns \  
> --vim_account aws-site  
b2b4a0e7-d009-460c-8ec9-80bbfc9752cc  
ubuntu@ip-192-168-72-101:~$
```

Someone feel free to
add detail here*****

Magma AGW Configuration

```
ubuntu@ip-192-168-72-101:~$ scp -i team7.pem rootCA.pem ubuntu@34.247.86.19:~
rootCA.pem                                100% 1204    2.7MB/s   00:00
ubuntu@ip-192-168-72-101:~$ ssh -i team7.pem ubuntu@34.247.86.19
Welcome to Ubuntu 20.04.4 LTS (GNU/Linux 5.13.0-1022-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Tue Jun 14 23:54:00 UTC 2022

System load:          0.08
Usage of /:           4.9% of 77.49GB
Memory usage:         13%
```

We used SCP and SSH commands to copy the CA file to the Magma AGW VM

```
ubuntu@ip-192-168-94-115:~$ sudo magma-access-gateway.configure --domain team7.osmhackfest.com
--root-ca-pem-path ./rootCA.pem
Magma AGW Configurator: Starting Magma AGW configuration ...
Magma AGW Configurator: Control Proxy configuration file already exists!
Magma AGW Configurator: This may indicate that this instance of Magma AGW is already integrated to an Orchestrator instance.
Magma AGW Configurator: If you continue, all existing configurations will be erased!
Do you want to proceed with the configuration process [Y/N]?Y
Magma AGW Configurator: [Errno 2] No such file or directory: '/var/opt/magma/configs/gateway.mconfig'
Magma AGW Configurator: Copying Root CA PEM from ./rootCA.pem to /var/opt/magma/tmp/certs ...
Magma AGW Configurator: Configuring Control Proxy ...
```

We then configured the Magma AGW with the appropriate domain and path for the CA file


```
ubuntu@ip-192-168-72-101:~$ osm ns-create --ns_name enb --nsd_name srs-lte-enb_nsd --vim_account aws-site --config "{vld: [{name: mgmt, vim-network-name: subnet-0163d410c9f3b88c8} ], additionalParamsForVnf: [{member-vnf-index: 'srsLTE', additionalParams: { bind_address_subnet: '192.168.64.0/19', mme_addr: '192.168.91.95', enb_mcc: '722', enb_mnc: '71'}}]}"
```

The creation of the NS, linking it to the AGW

```
ubuntu@ip-192-168-72-101:~$ osm ns-action enb --vnf_name "srsLTE" --vdu_id srsLTE-vdu --action_name attach-ue --params '{ u sim-imsi: "7221700000000008", usim-k: "c8eba87c1074eddd06885cb0486718341", usim-opc: "17b6c0157895bcaa1efc1cef55033f5f" }'
```

The deployment of attach-ue charm of the NS

srsLTE Setup Confirmation

NS Instances

🕒 init

✅ running / configured

❌ failed

📈 scaling

Entries 10

Name	Identifier	Nsd name	Operational Status	Config Status	Detailed Status	Actions
<input type="text" value="Name"/>	<input type="text" value="Identifier"/>	<input type="text" value="Nsd name"/>	<input type="text" value="Select"/>	<input type="text" value="Select"/>	<input type="text" value="Detailed Status"/>	
enb	803fc26b-af50-45bc-8843-ba502233f5b4	srs-lte-enb_nsd	✅	✅	Done	Action
magma_agw_ns	b2b4a0e7-d009-460c-8ec9-80bbfc9752cc	magma_agw_ns	✅	✅	Done	Action
magma_orc_cnf_ns	1b908761-3cd3-4b0a-a2f1-d35f4c2327c6	magma_orc_cnf_ns	✅	✅	Done	Action

VNF Instances

Entries 10

Identifier	VNFD	Member Index	NS	Created At	Actions
<input type="text" value="Identifier"/>	<input type="text" value="VNFD"/>	<input type="text" value="Member Index"/>	<input type="text" value="NS"/>	<input type="text" value="Created At"/>	
0138b573-6db0-4516-a573-ae1d53d3ab5a	srs-lte-enb_vnfd	srsLTE	803fc26b-af50-45bc-8843-ba502233f5b4	Jun-15-2022 11:23:18	
c690a059-5352-45c9-9100-46da4017a146	magma_orc_cnf	magma_orc_cnf	1b908761-3cd3-4b0a-a2f1-d35f4c2327c6	Jun-14-2022 15:41:27	
e7ad03b1-4afa-40b8-bc85-e682df605506	magma_agw_pnf	magma_agw-pnf	b2b4a0e7-d009-460c-8ec9-80bbfc9752cc	Jun-14-2022 19:13:45	

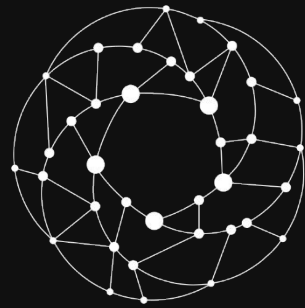
This confirms that the launch was successful

Challenges and Constraints We Faced

- ❖ Security Group rule was missing, leading to srsLTE network service failing to be configured.
- ❖ Communication between orc8r-orchestrator and orc8r-certifier components was broken, preventing us from creating a tenant to configure srsLTE with the AGW/add the subscribers.
- ❖ Our original cluster got corrupted forcing us to switch to team7's cluster.
- ❖ Our AWS Gateway became unreachable/broken.
- ❖ Route53 was not properly configured.
- ❖ We found out about the event 3 days prior to the start of the event.
- ❖ There is a 6 hour time zone difference behind the CEST.



These challenges and constraints took lot of our time to address, the OSM team helped us as much as they could to address these issues.



Open Source
MANO

Demonstration

Additional Developments

- Creation of script to attach/detach the UE through ns-action
- Script to create and deploy the VIM
- Script to create the srsLTE NS



Goals outside of Hackfest

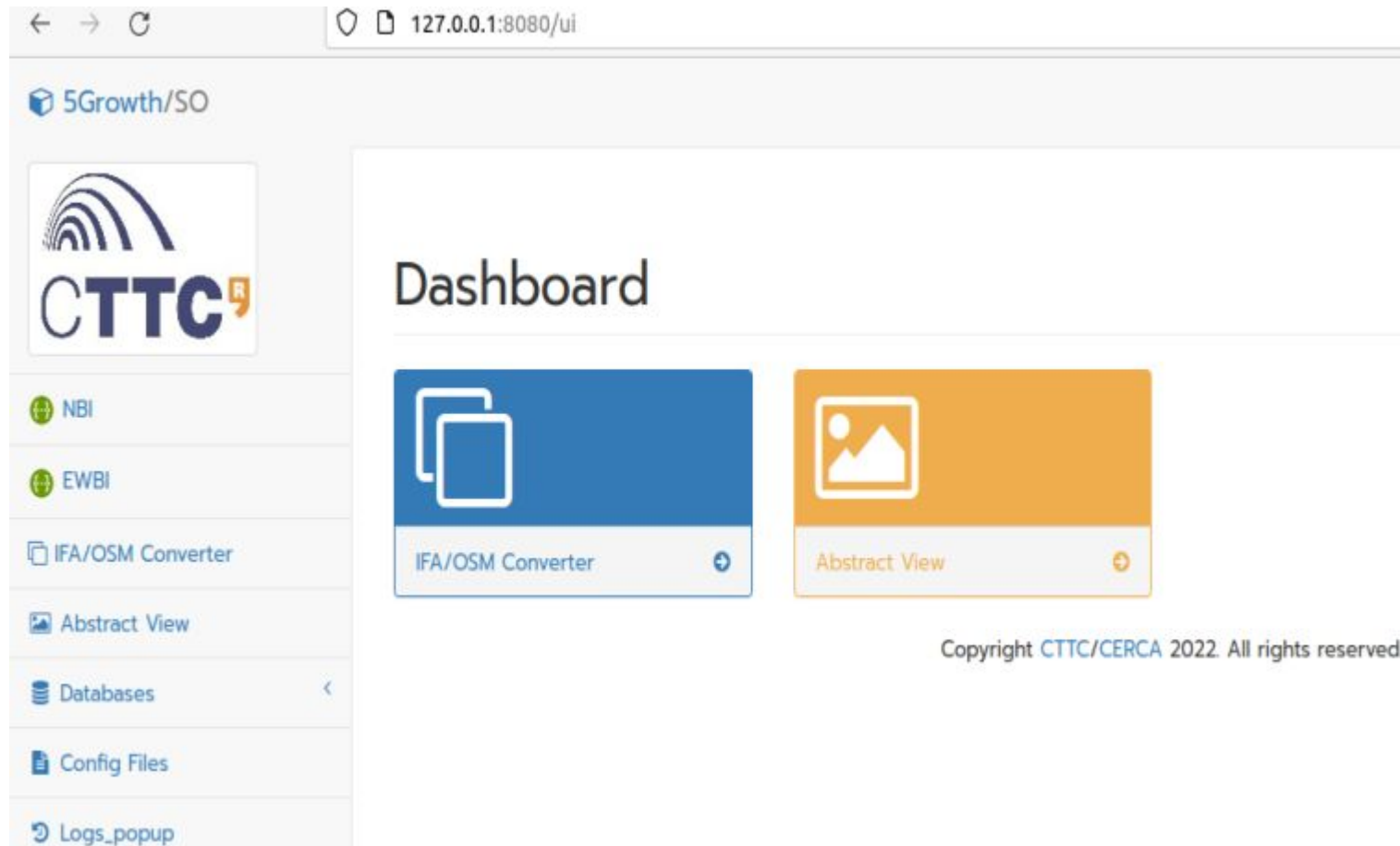
We are working on some experiments using OSM.

One of these is based on 5Growth as it has been used to support multi domain deployments specifically with a private 5G network and a public network.

Additionally it supports the use of multiple MANO platforms



5Growth Dashboard



Configuration

Local VS Config File

```
[VS]
number=3
VS1=10.0.200.227
VS2=127.0.0.1
VS3=10.0.0.30
VS4=10.0.200.235
VS5=10.0.200.234
```

Provider Domains Config File

```
[FEDERATION]
number=4
Provider1=10.0.200.233
Provider2=10.0.200.235
Provider3=10.0.200.234
Provider4=10.0.0.38
ewbi_port=8085
ewbi_path=/Sgt/so-ewbi/v1/ns/
```

MTP Config File

```
[MTP]
mtp_ip=127.0.0.1
mtp_port=8090
mtp_base_path=/Sgt/mtp/v1
```

Monitoring Config File

```
[MONITORING]
monitoring_ip=10.0.200.228
monitoring_port=8989
monitoring_base_path=/prom-manager
monitoring_pushgateway=no
monitoring_pushgateway_ip=192.168.100.1
monitoring_pushgateway_port=9091
monitoring_kafka_ip=10.0.200.228
monitoring_kafka_port=9092

[ALERTS]
monitoring_platform_ip=10.0.200.228
monitoring_platform_port=8989
monitoring_platform_base_path=/prom-manager
monitoring_platform_alert_target=http://10.0.200.227:8080/sla-manager/notifications
```


Configuration Continued

ROOE Config File

```
[PA]
pa.ip=10.0.200.231
pa.port=6161
pa.path=/5gt/so/v1/PAComp
pa.enable=yes
```

CoreMano Config File

```
[CoreMano]
name=osm
ip=192.168.1.139

[OSM]
release=11
ro_host=192.168.1.139/24
user=admin
password=admin
project=admin

[PA]
pa_enable=true
pa_simulate=false
```

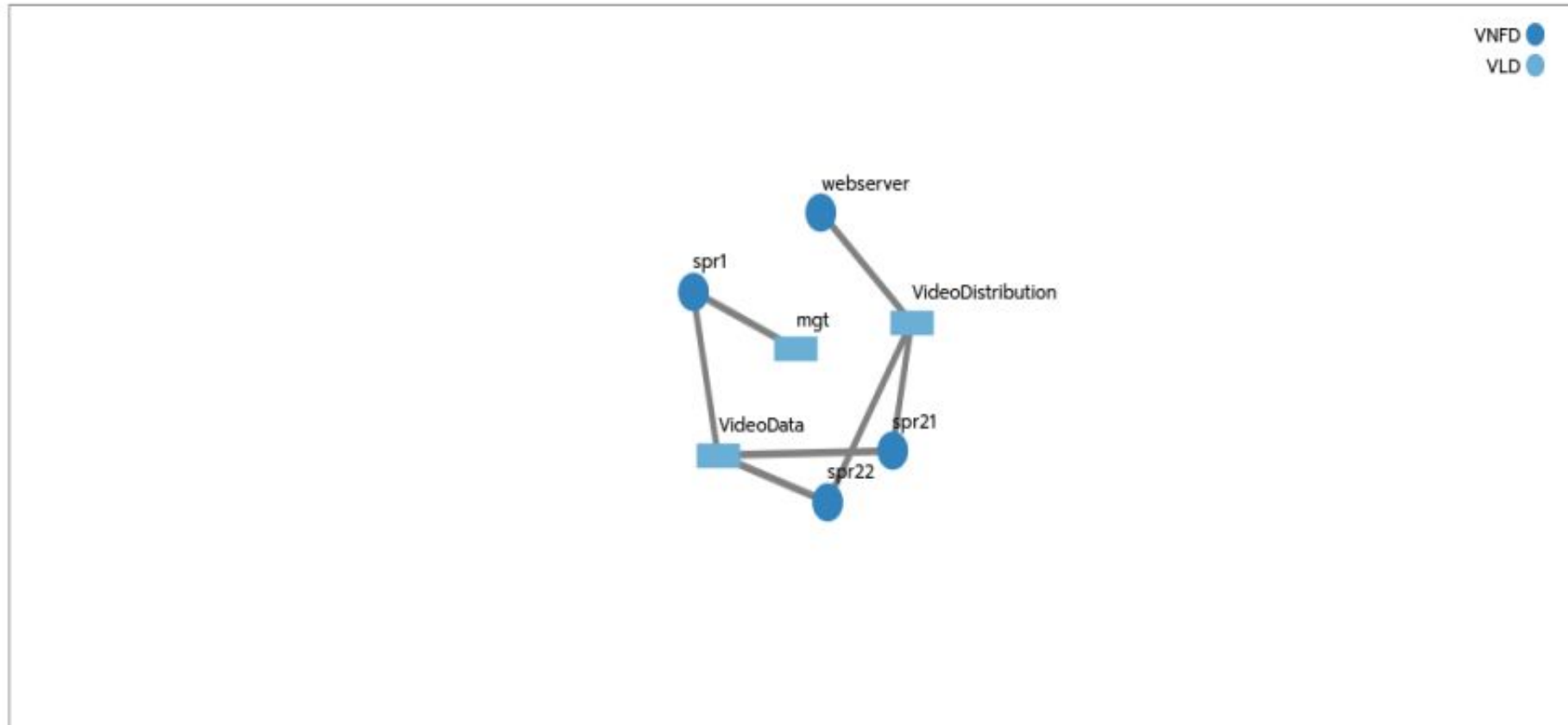
MongoDB Config File

```
[MongoDB]
db.ip=localhost
db.port=27017
```

Other Config File

Visualization of NSDs

Instantiation Levels: vCDN_v02_df_vCDN_il_vCDN_big ▾



OSM YAML descriptor

IFA YAML descriptor

Uploaded NSD

NSD List					
Nsd Id	Nsd Name	Version	Shareable	Domain	
vCDN_v02	vCDN_ATOS_TIMEO	0.2	True	local	  

```
{
  "nsd": {
    "nsdIdentifier": "vCDN_v02",
    "designer": "Nextworks",
    "version": "0.2",
    "nsdName": "vCDN_ATOS_TIMEO",
    "nsdInvariantId": "vCDN_ATOS_TIMEO_v02",
    "vnfdId": ["webserver", "spr21", "spr22", "spr1"],
    "sapd": [
      {
        "cpdId": "mgtSap",
        "description": "Management SAP for all the vCDN VNFS",
        "layerProtocol": "IPv4",
        "cpRole": "ROOT",
        "addressData": [
          {
            "addressType": "IP_ADDRESS",
            "ipAddressAssignment": false,
            "floatingIpActivated": true,
            "ipAddressType": "IPv4",
            "numberOfIpAddress": 1
          }
        ],
        "sapAddressAssignment": false,
        "nsVirtualLinkDescId": "mgt"
      },
      {
        "cpdId": "videoSap",
        "description": "SAP interconnecting to the CDN clients",
        "layerProtocol": "IPv4",
        "cpRole": "ROOT",
        "addressData": [
          {
            "addressType": "IP_ADDRESS",
            "ipAddressAssignment": false,
            "floatingIpActivated": true,
            "ipAddressType": "IPv4",
            "numberOfIpAddress": 1
          }
        ],
        "sapAddressAssignment": false,
        "nsVirtualLinkDescId": "VideoDistribution"
      }
    ]
  },
  "virtualLinkDesc": [
    {
      "virtualLinkDescId": "VideoDistribution",
      "virtualLinkDescProvider": "NMW",
      "virtualLinkDescVersion": "0.1",
      "connectivityType": {
        "layerProtocol": "IPv4"
      }
    },
    {
      "virtualLinkId": "df_VideoDistribution",
      "flavourId": "df_VideoDistribution",
      "qos": {
        "latency": 0,
        "packetDelayVariation": 0,
        "packetLossRatio": 0,
      }
    }
  ]
}
```

```
nsd:nsd-catalog:
  nsd:
    - connection-point:
      - floating-ip-required: true
        member-vnf-index-ref: '2'
        name: mgtSap_0
        type: VPORT
        vnfd-connection-point-ref: spr1MgtExt
        vnfd-id-ref: spr1
      - floating-ip-required: true
        member-vnf-index-ref: '1'
        name: videoSap_0
        type: VPORT
        vnfd-connection-point-ref: webDistExt
        vnfd-id-ref: webserver
      - floating-ip-required: true
        member-vnf-index-ref: '3'
        name: videoSap_1
        type: VPORT
        vnfd-connection-point-ref: spr21DistExt
```

test	fgt-1f328c0-1f04-4d11-9390-220e8c415139	INSTANTIATING	vCDN_v02	df_vCDN / il_vCDN_big					
------	---	---------------	----------	--------------------------	--	--	---	---	---

Thank you for the Hackfest13 event.

Thank you to all the mentors!

Thank you to the teams and team members!

We are looking forward to working with all of you