

OSM#13 Hackfest Magma 5G Core Onboarding Challenge

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Table of contents



- Amazon cloud Infrastructure
- Onboard Magma Orchestrator and instantiate it
- Configure AWS Route53
- Configure Magma Orchestrator through the UI
- Onboard Magma AGW and instantiate it
- Configure Magma AGW
- Onboard srsLTE eNB & UE simulator and instantiate it
- Conclusions

Infrastructure provided by the organizators





Steps to access the Amazon cloud workspace (AWS)

- Go to Amazon console <u>https://aws.amazon.com/es/console/</u>
- Sign-in with IAM user
 - Account ID: 891210054201
 - IAM user: team1
 - Password: password123!
- Install AWS CLI in a local machine
 - curl "https://awscli.amazonaws.com/awscli-exe-linux-x86_64.zip" -o "awscliv2.zip"
 - sudo unzip awscliv2.zip
 - sudo ./aws/install
- Configure AWS
 - aws configure

mdalgitsis@CPU00426:~\$ aws configure AWS Access Key ID [None]: AKIA47ACCHI44VB5FKF7 AWS Secret Access Key [None]: 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 Default region name [None]: us-east-1 Default output format [None]: json







Configuration scenario & overview





Configure AWS Route53

Install admin_operator.pfx in the web browser

Configure Magma Orchestrator through web UI



Deploy Magma Orchestrator



Access Kubernetes cluster - EKS



- Install eksctl <u>https://docs.aws.amazon.com/eks/latest/userguide/eksctl.html</u>
- Install kubectl <u>https://kubernetes.io/docs/tasks/tools/install-kubectl-linux/</u>
- Since the K8s cluster is already provided, we need to export the configuration file that corresponds to Team1
 - Make a folder .kube: *mkdir ~/.kube*
 - Copy paste in .kube the kube_config file from google drive
 - Export configuration: *export KUBECONFIG=~/.kube/kube_config*
 - Check the nodes of the cluster: *kubectl get nodes*

mdalgitsis@CPU00426:~\$ kubectl	get nodes			
NAME	STATUS	ROLES	AGE	VERSION
ip-192-168-40-86.ec2.internal	Ready	<none></none>	5d20h	v1.22.6-eks-7d68063
ip-192-168-8-194.ec2.internal	Ready	<none></none>	5d20h	v1.22.6-eks-7d68063

- Other commands to check what is in the EKS cluster:
 - Get a list of all the running pods : *kubectl get pods -A*
 - Get a list of all namespaces: kubectl get namespaces



Access OSM EC2 instance (1/2)



- sudo ssh -i team1-key.pem ubuntu@184.73.40.173
- With osm -h we can see all the available commands we can execute through osm machine
 - Check the added VIMs: osm vim-list
 - Check the added Kubernetes clusters: osm k8scluster-list
- Also, since OSM has been installed upon another Kubernetes cluster with microk8s.kubectl we can interact with it: *microk8s.kubectl get namespaces*



ubuntu@ip-192-168-32	-40:~\$ mi	crok8s.kubectl	get	namespaces
NAME	STATUS	AGE		
kube-system	Active	4d1h		
kube-public	Active	4d1h		
kube-node-lease	Active	4d1h		
default	Active	4d1h		
metallb-system	Active	4d1h		
ingress	Active	4d1h		
controller-osm-vca	Active	4d1h		
osm	Active	4d1h		



Access OSM EC2 instance (2/2)



• Lastly, we can access OSM GUI's on:

https://ui.184.73.40.173.nip.io/login

- Username: admin
- ubuntu@ip-192-168-32-40:~\$ env | grep OSM_PASSWORD

OSM_PASSWORD=8975766776cb4a543213b6ec122bdc91





Registered K8s clusters

🕓 PROCESSING 🥑 ENABLED 💈 ERROR

Name	^ Identifier	K8 Version	Operational State	Created	Modified
Name	Q Identifier	Q K8 Version	Q. Select	♦ Created	Q Modified
eks-cluster	ae81d925-9656-4ad7-b168-a6a9c9ee9c44	1	O	Jun-11-2022 20:47:11	Jun-11-2022 20:47:17



Magma orchestrator Onboarding to OSM (1/3)



• On the OSM instance we have created a directory called packages and uploaded all the files provided for Magma orchestrator, AGW and srsLTE though SSH:



Magma orchestrator Onboarding to OSM (2/3)



- Onboarding to OSM
 - osm nfpkg-create magma_orc_cnf.tar.gz

magma_orc_cnf	c9517635-a813-44f6-b235-f10d4fff9066	1.0	Canonical	K8s container deployment of Magma Orchestrator

osm nspkg-create magma_orc_ns.tar.gz

magma_orc_cnf_ns 7ddb5e05-fa4f-4c58-9ade-50dbf493e3f0	1.0	Canonical	NS with 1 KDU connected to the mgmtnet VL
---	-----	-----------	---

- Instantiating
 - osm ns-create --ns_name magma_orc_cnf_ns --nsd_name magma_orc_cnf_ns --vim_account aws-site
 - Magma ORC takes around 15 min to be deployed:

juju status -m magma-orc-kdu-898e9ce1-f59b-4fea-a309-4a4022e766c5 --watch 10s

<i>J0.J0.</i>						200		orc8r-aventd orc8r-ha orc8r-lte		1 magna-orcBr-aventd edge 6 20.200.45.500 2 magna-orcBr-ha edge 6 20.201.45.500 1 magna-orcBr-ha edge 12 20.500.227.55	no no ni installing agent
			NS Instances					order-metricso order-ngine arctr-absidian order-absidian order-palicyde		magna-erc8-metricsid adge n 100, 12, 130 magna-erc8-metricsid edge 50, 100, 12, 130 100, 120, 120, 120, 120, 120, 120, 120,	no no no no installing agent
2	2	-	🌖 init 🥝 running / configured	d 🔕 failed 💉 scaling				orcer-promotions-cache orcer-promotions-cache orcer-sand orcer-sand orcer-state	watting	1 promethyla-Asis woga 40 productor. 1 promethyla-Asis edge 8 19.109.112,220 1 magma-ordir-nervice-registry edge 5 19.100.113,220 1 magma-ordir-nervice-registry edge 5 19.100.116,125 1 magma-ordir-state edge 8 19.100.101.125,233 1 magma-ordir-state edge 8 19.100.101.131 1 magma-ordir-state	no no no installing agent no installing agent
1 NS Packages	1 VNF Packages	1 VIM Accounts	Name	^ Identifier	Nsd name	Operational Status	Config Status	ordir-subscriberdb erdir-subscriberdb-tache ordir-temarts ordir-temarts postgradiana postgradiana	waiting waiting waiting postgreeql@wd0037f waiting	sagma-ort2r-subscriberdb edge 9 10.100.122.51 magma-ort2r-subscriberdb edge 9 10.100.52.84 magma-ort2r-subscriberdb edge 9 10.100.52.74 magma-ort2r-subscriberdb edge 9 10.100.57.78 grafana-k8s edge 50 10.00.58.78 postgresql-Ads stale 40.100.58.85	no installing agent no installing agent no installing agent no
		<i>t</i> ≜	Name	Q Identifier	Q Nsd name	Q. Select	♦ Select	kan it nas-augasits/0+ nas-agina-proxy/0+ ertitr-accessid/0+	orkload Agent Address atting tile 102.1881 titing tile 102.1881 atting tile 102.1881	Ports Message Waiting for database relation to be established 170 127 127 Waiting for database relation to be established	
1 NS Instances	** 1 VNF instances	0 SDN Controller	magma_orc_cnf_ns	898e9ce1-f59b-4fea-a309-4a4022e766c5	magma_orc_cnf_ns	0	0	ord#r-alkert#minagery0* ord#r-akety1*cs/0* ord#r-boutstragoery0* ord#r-contiguratery0* ord#r-contiguratery0* ord#r-contiguratery0* ord#r-dovctory00* ord#r-divectory00*	Cture isle 192.186. Cture ille 192.186. Cture ille 192.180. Cture ille 192.180. Atting ille 192.180. Atting ille 192.180. Atting ille 192.180. Atting ille 192.180. Atting ille 192.180.	29.155 26.16 26.17 26.17 26.17 26.19 2	
								ordir-eventd/d# ordir-ha/d# ordir-ha/d# ordir-entricsd/d# ordir-entricsd/d# ordir-englos/d#	tive une 192,560, true une 192,	08.005 20.186 2.126 Maiting for database relation to be established 29.10 2.14	
magma_orc_cnf_ns	898e9ce1-f59	b-4fea-a309-4a4022e766c5	magma	_orc_cnf_ns			Done	orcs-acs/size/o* orcs-acs/size/taise/b* orcs-policydb/0* orcs-promethaux-ceth/0* orcs-promethaux/d* orcs-size/o* orcs-size/0*	Club Life 192.156 aiting Gla 192.156 club 192.166 192.166 atting Gla 192.166	12.12 10.16 10.16 10.16 10.22 10.22 10.24 00.35 00.35 Waiting for database relation to be established 0.32 0.35 Waiting for database relation to be established 7.34	
					-			accBr-st/manaer/3* arcBr-subscriberdb-cacha/8* orcBr-subscriberdb/8* arcBr-tenarts/0* arcBr-tenarts/0* arcBr-user_drafana/8* postgrest_stBs/8*	tive tile 192.160. atting tile 192.160. atting tile 192.160. atting tile 192.160. atting tile 192.160. tive tile 192.160. iting tile 192.160.	44.67 Waiting for database relation to be established 22.357 Waiting for database relation to be established S.51 Waiting for database relation to be established 32.138 5432/TCP waiting for container	

Magma orchestrator Onboarding to OSM (3/3)



• After onboarding the KNF and NS packages and instantiating the network service, the Magma Orchestrator is running on the EKS



<pre>mdalgitsis@CPU00426:~\$ kubectl</pre>	get pods	-n magma-	-orc-kdu-898	Be9ce1-f59b-4fea-a309-4a4022
NAME	READY	STATŪS	RESTARTS	AGE
modeloperator-6c87ffbb48-7bzlf	1/1	Running	Θ	19h
nms-magmalte-0	2/2	Running	Θ	19h
nms-nginx-proxy-0	2/2	Running	Θ	19h
orc8r-accessd-0	2/2	Running	Θ	19h
orc8r-alertmanager-0	2/2	Running	Θ	19h
orc8r-analytics-0	2/2	Running	Θ	19h
orc8r-bootstrapper-0	2/2	Running	Θ	19h
orc8r-certifier-0	2/2	Running	Θ	19h
orc8r-configurator-0	2/2	Running	Θ	19h
orc8r-ctraced-0	2/2	Running	Θ	19h
orc8r-device-0	2/2	Running	Θ	19h
orc8r-directoryd-0	2/2	Running	Θ	19h
orc8r-dispatcher-0	2/2	Running	Θ	19h
orc8r-eventd-0	2/2	Running	Θ	19h
orc8r-ha-0	2/2	Running	Θ	19h
orc8r-lte-0	2/2	Running	Θ	19h
orc8r-metricsd-0	2/2	Running	Θ	19h
orc8r-nginx-0	2/2	Running	Θ	19h
orc8r-obsidian-0	2/2	Running	Θ	19h
orc8r-orchestrator-0	2/2	Running	Θ	19h
orc8r-policydb-0	2/2	Running	Θ	19h
orc8r-prometheus-0	2/2	Running	Θ	19h
orc8r-prometheus-cache-0	2/2	Running	Θ	19h
orc8r-service-registry-0	2/2	Running	Θ	19h
orc8r-smsd-0	2/2	Running	Θ	19h
orc8r-state-0	2/2	Running	Θ	19h
orc8r-streamer-0	2/2	Running	Θ	19h
orc8r-subscriberdb-0	2/2	Running	Θ	19h
orc8r-subscriberdb-cache-0	2/2	Running	Θ	19h
orc8r-tenants-0	2/2	Running	Θ	19h
orc8r-user-grafana-0	2/2	Running	Θ	19h
postgresql-k8s-0	1/1	Running	Θ	19h
postgresql-k8s-operator <u>-</u> 0	1/1	Running	Θ	19h
mdalgitsis@CPU00426:~\$				



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Kubernetes EKS cluster

AWS Route53 configuration (1/3)



- After instantiating Magma orchestrator, there are services running in the EKS cluster related to it.
- With *kubectl get services -n magma-orc-kdu-898e9ce1-f59b-4fea-a309-4a4022e766c5* we can see all these services
- However we are interested in to the LoadBalancer service type
 - kubectl get services -n magma-orc-kdu-898e9ce1-f59b-4fea-a309-4a4022e766c5 | grep LoadBalancer
- Here we can find the Internal and External IP addresses

mdalgitsis@CPU00426:~\$ kubectl get	: services - <mark>n</mark> magm	na-orc-kdu-898e9ce	1-f59b-4fea-a309-4a4022e766c5 grep LoadBalancer	
nginx-proxy	LoadBalancer	10.100.142.226	a9595c63431634e0ba3286a6f36bbf4b-579836936.us-east-1.elb.amazonaws.com	443:30037/TCP
	25h			
orc8r-bootstrap-nginx	LoadBalancer	10.100.255.13	a86135fcab10f49f2bb0cf01832a0931-1815485410.us-east-1.elb.amazonaws.com	80:31200/TCP,443:3
0747/TCP,8444:30618/TCP	25h			
orc8r-clientcert-nginx	LoadBalancer	10.100.231.81	a8b9ce†61†b434ca6b93d6a54e1b76a†-477984819.us-east-1.elb.amazonaws.com	80:32284/TCP,443:3
1742/TCP,8443:32118/TCP	25h			
orc8r-nginx-proxy	LoadBalancer	10.100.145.38	a74e7tt9c1c57419t8629t226tc5e593-640115595.us-east-1.elb.amazonaws.com	80:32199/TCP,8443:
31395/TCP,8444:32671/TCP,443:30338	3/TCP 25h			

AWS Route53 configuration (2/3)



- To configure AWS Route53 appropriately we need to create A records.
- One way is through the AWS console and another is through the AWS CLI.
- Through the AWS CLI, we need to create an arecords.json file like the one on the figure
- The DNSName field must be filled according to the services from the previous slide using the external IP.
- We apply this file with the command:
 - aws route53 change-resource-record-sets --hosted-zone-id Z0309839BG6MW88K4E1V --change-batch <u>file://arecords.json</u>
- **NOTE**: We execute this command from our local terminal, neither from EKS nor from any EC2 instance



AWS Route53 configuration (3/3)



• We can confirm that all run well either by AWS CLI or by AWS Console

mdalgitsis@CPU00426:~\$ aws route53 change-resource-record-sets --hosted-zone-id Z0309839BG6MW88K4E1V --change-batch file://arecords.json "ChangeInfo": { "Id": "/change/C0542281RQZKUSPRZUH4", Confirm by "Status": "PENDING", "SubmittedAt": "2022-06-15T12:38:42.566000+00:00", "Comment": "Create A Records for VESUVIUS "

mdalgitsis@CPU00426:~\$ aws route53 get-change --id /change/C0542281RQZKUSPRZUH4

"ChangeInfo": { "Id": "/change/C0542281RQZKUSPRZUH4", "Status": "INSYNC", "SubmittedAt": "2022-06-15T12:38:42.566000+00:00", "Comment": "Create A Records for VESUVIUS "

Description

Returns the current status of a change batch request. The status is one of the following values:

- PENDING indicates that the changes in this request have not propagated to all Amazon Route 53 DNS servers. This is the initial status of all change batch requests.
- INSYNC indicates that the changes have propagated to all Route 53 DNS servers.

	Regi:	stros (14) Información o Automatic es el comportamiento	actual de búsqueda que se ha	optimizado para o	btener los mejores resulta
	C	Eliminar registro	Importar archivo de zo	ona Cre	ar un registro
	Q	iltrar registros por propiedad c	valor		
		Nombre del registro	▽	Tipo ⊽	Polític 🔻
Confirm by AWS Console		osmhackfest.com		NS	Simple .
		osmhackfest.com		SOA	Simple -
		api.team1.osmhackfest.com	1	А	Simple .
		bootstrapper-controller.tea	m1.osmhackfest.com	А	Simple .
		controller.team1.osmhackf	est.com	А	Simple .
		*.nms.team1.osmhackfest.c	om	Α	Simple .

AWS CLI



- Magma Orchestrator installation provides us a GUI. To access it we need to use a certificate
- We need to check the models and download the Orchestrator's certificates for our browser from the OSM machine with the juju command:



• Export it to our local environment

Download certificates – Part 1 (2/2)



Install the admin_operator.pfx certificate on the browser with the password: password123

Certificados ×	×	×	×
Propósito planteado: <todos> ~</todos>	 <i>B</i> Asistente para importar certificados 	← IJ Asistente para importar certificados	 Asistente para importar certificados
Personal Otras personas Entidades de certificación intermedias Entidades de certificación	Este es el Asistente para importar certificados	Protección de clave privada	Almacén de certificados
Emitido para Emitido por Fecha de Nombre descriptivo	Lite es el Asistente para importar certificados	Para mantener la seguridad, la dave privada se protege con una contraseña.	Los almacenes de certificados son las áreas del sistema donde se guardan los certificados.
IE 1905/8-0959-90 IE 1905/8-0959-9059. IS/06/2023 Microsoft Your P IS/05/2023 Microsoft Your P IS/9598874-79ea-4d MS-Organization-Access 28/04/2031 <\Inguno>	Este asistente lo ayuda a copiar certificados, listas de certificados de confianza y listas de revocación de certificados desde su disco a un almacén de certificados.	Escribe la contraseña para la clave privada.	Windows puede seleccionar automáticamente un almacén de certificados; también se puede especificar una ubicación para el certificado.
admin_operator certifier.galaxy.sena 8/03/2032 admin_operator admin_operator certifier.magma.test 13/03/2023 <\Vinguno> b8d3945e-f6b8-4e MS-Organization-Access 28/04/2031 <\Vinguno>	Un certificado, que lo emite una entidad de certificación, es una confirmación de su identidad y contiene información que se usa para proteger datos o para establecer conexiones de red seguras. Un almacén de certificados es el área del sistema donde se guardan los certificados.	Co <u>n</u> traseña: password 123	 Seleccionar automáticamente el almacén de certificados según el tipo de certificado Colocar todos los certificados en el siguiente almacén Almacén de certificados:
		Qpciones de importación: ☐ Habilitar protección segura de clave privada. Si habilitas esta opción, se te avisará cada vez que una aplicación use la clave privada.	Personal Egaminar
Propósitos planteados del certificado <todos></todos>	Haga dic en Siguiente para continuar.	Marcar esta dave como exportable. Esto te permitirá hacer una copia de seguridad de las daves o transportarlas en otro momento. Proteger la clave privada mediante seguridad basada en virtualización (no exportable)	
Ver		Induir todas las propiedades extendidas.	
Çerrar	Siguiente Cancelar	Siguiențe Cancelar	Siguien <u>t</u> e Cancelar



Day-2 actions to get credentials for Magma Orchestrator GUI (1/2)



- Get the GUI credentials
- \$ osm ns-action magma_orc_cnf_ns \
- --vnf_name magma_orc_cnf \
- --kdu_name magma-orc-kdu \
- --action_name get-admin-credentials
- \$ osm ns-op-show 989205c5-c081-4957-9cbd-c11e532578c3

	Magma	
Email		
Password		
		Login

9205c5-c081-4957-9cbd- untu@ip-192-168-32-40: untu@ip-192-168-32-40:	:11e532578c3 ∾\$ ~\$ osm ns-op-show 989205c5-c081-4957-9cbd-c11e532578c3
field	value
_id id operationState	"989205c5-c081-4957-9cbd-c11e532578c3" "989205c5-c081-4957-9cbd-c11e532578c3" "COMPLETED"
queuePosition stage	
errorMessage detailedStatus	null
statusEnterediume nsInstanceId lemonerationType	1655221980.273547 "898e9ce1-f59b-4fea-a309-4a4022e766c5" "action"
startTime isAutomaticInvocation	1655321971.1564357 false
	<pre>"member_vnf_index": "magma_orc_cnf", "kdu_name": "magma_orc-kdu", "primitive": "get-admin-credentials", "primitive_params": {}, "lcmOperationType": "action", "nsInstanceId": "898e9ce1-f59b-4fea-a309-4a4022e766c5" }</pre>
links	Talse { "self": "/osm/nslcm/v1/ns_lcm_op_occs/989205c5-c081-4957-9cbd-c11e532578c3", "nsInstance": "/osm/nslcm/v1/ns_instances/898e9ce1-f59b-4fea-a309-4a4022e766c5" }
_admin	<pre>{ "created": 1655321971.1564708, "modified": 1655321980.2735484, "projects_read": [</pre>
	"148d26145a1c48b3be135a71d28fdf3d"], "worker": "619bc1924b80"
detailed-status	{ "Code": "0", "admin-password": "eFFMGLqloElv", "admin-username": "admin@team1.osmhackfest.com"

Day-2 actions to get credentials for Magma Orchestrator GUI (2/2)



Access the <u>https://master.nms.team1.osmhackfest.com</u> with the credentials



Configuration of Magma Orchestrator (1/7)



Create new tenant in the NMS



Organization: vesuvius Basic Info Norme Vesuvius Image: NMS Image:	C A No seguro https://maste	ims.team1.osmhaddfest.com/master/organizations/detail/vesuvius	A	10	 œ	G	4	G	5	-	
Basic Info Name Vesuvius	Organization: vesu	ius									
		Basic Info Name vesuvius									
CSV Charset (default: uff-8) Single Sign-On Disabled ✓ save		NMS									
CSV Charset (default: utf-8) Single Sign-On Disabled *		Advanced Settings									
Single Sign-On Disabled ~		CSV Charset (default: utf-8)									
		Single Sign-On Disabled									
		Sove									



20

Configuration of Magma Orchestrator (2/7)



 Create NMS user for tenant: User: <u>user@team1.osmhackfest.com</u>
 Password: password1234
 Role: superuser



Configuration of Magma Orchestrator (3/7)

🔲 🛛 🧱 Slack | hackfest13-team1 | Open 🗙 🛛 😫 DeepL Translate - El mejor traduc 🗙 🕘 Magma



Log in to the NMS <u>https://vesuvius.nms.team1.osmhackfest.com</u>

	\leftarrow $ ightarrow$ \bigcirc \bigcirc \land No seguro http://www.http://wwww.http://wwww.http://www.http://www.htttp://www	c://vesuvius.nms.team1.osmhackfe	st.com/nms/team1_test/dashbo	pard/network			A* to 🕫 🤇) ଓ 🎓 🖻 🏐 -
	Dashboard							
	Pr Network					Filter By Di	ate June 12th 02:58 pm	to June 15th 02:58 pm
Magma	Trequency of Aler	ts and Events						
Fmail	1.0-							Alerts Events
user@team1.osmhackfest.com	© 0.5							
Password		• • •	•	• • •	• • •	•	• •	
	-0.5							
	di la construcción de la	an a	1 pt	29th 127th	√P ^{n™} Date	g th	II.	1 perturbation of the second s
Login	(i) Alerte (0)							
	() Alerts (0)	Critical(0)		🛕 Major(0)	() M	inor(0)	0	Other(0)
			_	You have 0 To add alert trigge	Critical Alerts rs click alert settings			
	() (.							
	Gateways	Severe Events O	Connected 1	Disconnected O	ා eNodeBs	Severe Events O	Total O	Transmitting O

Configuration of Magma Orchestrator (4/7)



Create an LTE network in tenant's NMS

🔲 🛛 🐺 Slack hackfest 13-team 1 Open 🛛 🗙 📔 🌒 DeepL Translate - El mejor trad	🔲 🛛 🥰 Slack hackfest13-team1 Open x 🗍 😫 Deepl. Translate - El mejor tradu: x 🗍 🕲 Magma	× 💿 Magma × +	- o ×	Add Network	_ ×
← → C ▲ No seguro Ntps://vesuvius.nms.team1.osmh	← → C ▲ No seguro https://vesuvius.nms.team1.osmhackfest.com/nms/team	1_test/network/network	^ ☆ @ 0 0 4 6 5 👙 …	Add Network	~
Dashboard	Network			Network Epc	Ran
F Network	い デ Network		Add Network Edit JSON		
Alerts and Events	₹ Overview			Network ID	
	Gateways eNodeBs 🖗 0	Subscribers ♣ 10	лрыз Эр 1	team1_test	
	Network	Edit EPC	Edit	Network Name	
~ -0.5	team1_test	Policy Enforcement Enabled Disabled		com_cost	
1.0 	W Name team1_test	LTE Auth AMF	8	Add Description team1_test	
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Configuration of Magma Orchestrator (5/7)



• Configure PLMN (MCC: 722, MNC: 17)

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Configuration of Magma Orchestrator (6/7)



Create APN (name: default)



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Configuration of Magma Orchestrator (7/7)



• Import subscribers to the NMS (csv file available on each team's Google Drive)

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Deploy Magma Access GW



Magma Access GW – PDU



• Before we onboard the PNF into OSM, we need to tell OSM about the PDU. We need the VIM-ID:

ubuntu@ip-192-168-32-40:~\$ osm vim-list | grep aws | awk '{print \$4}' afd90edc-bb75-4b98-8f39-9ab2a136a624 ubuntu@ip-192-168-32-40:~\$

- We create a pdu.yaml descriptor file in our working directory. The pdu.yaml file must have a specific structure:
 - vim_account: afd90edc-bb75-4b98-8f39-9ab2a136a624
 - Magma AGW SGi IP: 192.168.51.193
 - Magma AGW S1 IP: 192.168.34.52





PDU Instances

ubuntu@ip-192-168-32-40:~/packages\$ osm pdu-create --descriptor_file \pdu.yaml b564062d-6fac-451a-b0f2-29cb3d07c421 ubuntu@ip-192-168-32-40:~/packages\$

Identifier	♠ Name	^ Type	≜ UsageState	Created At
		.,,-) - (
	Q Name	С Туре	Q UsageState	Created At
81afcc85-2e66-4fb7-97a4-608168b497d5	MagmaAGW	gateway	IN_USE	Jun-15-2022 17:29:48
b564062d-6fac-451a-b0f2-29cb3d07c421	MagmaAGW	gateway	NOT_IN_USE	Jun-15-2022 17:30:13

Onboarding Magma Access GW



• Creating packages

\$ osm nfpkg-create magma_agw_pnf.tar.gz

\$ osm nspkg-create magma_agw_ns.tar.gz

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Instantiating Magma Access GW



• Instantiating the Network Service



• We can now orchestrate the Magma AGW EC2 machine



Download certificates – Part 2 (1/2)



- After instantiating the Magma AGW Network Service, from the OSM machine, we have to download a key with the following command:
 - juju scp -m \$model-name --container="magma-orc8r-certifier"

orc8r-certifier/0:/var/opt/magma/certs/..data/rootCA.pem \

rootCA.pem



Download certificates – Part 2 (2/2)



• Then, we have to copy & paste it into the Magma AGW EC2 machine.



Access Magma AGW EC2



- ssh -i team1-key.pem <u>ubuntu@54.161.100.52</u>
- Paste the rootCA.pem file
- Then, run the command:
 - magma-access-gateway.configure --domain <u>team1.osmhackfest.com</u> --root-ca-pempath ./rootCA.pem
- Magma AGW configuration starts
 - Copying files
 - Configures Control Proxy
 - Restart services
- When the configuration is done, we must add the Access Gateway to Magma Orchestrator

ubuntu@ip-192-168-51-193:~\$ ls rootCA.pem

Magma AGW configuration



root@ip-192-168-51-193:/home/ubuntu# magma-access-gateway.configure \	
>domain team1.osmhackfest.com \	
>root-ca-pem-path ./rootCA.pem	
Magma AGW Configurator: Starting Magma AGW configuration	
Magma AGW Configurator: Copying Root CA PEM from ./rootCA.pem to /var/opt/magma/tmp/certs	
Magma AGW Configurator: Configuring Control Proxy	
Magma AGW Configurator: Restarting Magma AGW services	STFP1
Magma AGW Configurator: Stopping magma@* service	
Magma AGW Configurator: <u>Restarting magma@magmad service</u>	
Magma AGW Configurator: Magma Access Gateway configuration done!	
Magma AGW Configurator: To add this Access Gateway to an Orchestrator please use hardware secrets prin	ted below:
Magma AGW Configurator:	
Magma AGW Configurator: Hardware ID	
Magma AGW Configurator:	
Magma AGW Configurator: 7bee1da2-2152-4fec-8c6b-fc69a1f2f07c	
Magma AGW Configurator:	
Magma AGW Configurator: Challenge key	
Magma AGW Configurator:	
Magma AGW Configurator: MHYwEAYHKoZIzj0CAQYFK4EEACIDYgAEZn6R6Hmai2vbtf/FzMybVJOm7TMt/5oReJWiOhR/AR42gL	EJkuxT2QkEOi3gEROchGw4lqkWIpuyIV1Ebw4iy///hOn+Z98n3ynkvrrJ63B7ENk1xCqMjG/76zXWA8uT
Magma AGW Configurator:	
Magma AGW Configurator: Build info	
Magma AGW Configurator:	
Magma AGW Configurator: Commit Branch: unknown	
Magma AGW Configurator: Commit Tag: unknown	
Magma AGW Configurator: Commit Hash: unknown	
Magma AGW Configurator: Commit Date: unknown	
Magma AGW Configurator:	
Magma AGW Configurator: Notes	
Magma AGW Configurator:	
Magma AGW Configurator: - Hardware ID is this gateway's unique identifier	
Magma AGW Configurator: - Challenge key is this gateway's long-term keypair used for	
Magma AGW Configurator: bootstrapping a secure connection to the cloud	CTED
Magma AGW Configurator: - Build info shows git commit information of this build	SIEF2
Magma AGW Configurator:	
Magma AGW Configurator:	
Magma AGW Configurator: Once Access Gateway is integrated with the Orchestrator, run magma-access-gate	way.post-install to verify the installation.

STEP1 - Integrate Access gateway with magma Orchestrator (1/2)



 Access the Magma Orchestrator through web GUI and select equipment, then select gateways



STEP1 - Integrate Access gateway with magma Orchestrator (2/2)



Add the new gateway with the hardware ID and challenge key from the previous AGW configuration

Magma AGW Configurator: Hardware ID

Magma AGW Configurator: ------

Magma AGW Configurator: 7bee1da2-2152-4fec-8c6b-fc69a1f2f07c

Magma AGW Configurator:

Magma AGW Configurator: Challenge key

Magma AGW Configurator: -----

Magma AGW Configurator: MHYwEAYHKoZIzj0CAQYFK4EEACIDYgAEZn6R6Hmai2vbtf/FzMybVJOm7TMt/5oReJWiOhR/AR42gLEJkuxT2QkEOi3gEROchGw4lqkWIpuyIV1Ebw4iy///hOn+Z98n3ynkvrrJ63B7ENk1xCqMjG/76zXWA8uT Magma AGW Configurator:

Add New Gateway						×
Gateway	Aggregation	Ерс	Ran	APN Resources	Header	Enric
Gateway Name						
mygateway						
Gateway ID						
mygateway						
Hardware UUID						
7beelda2-21S2-4	fec-8c6b-fc69alf2f07c					
Version						
1						
Gateway Descriptio	n					
mygateway						
Challenge Kev						
MHYWEAYHKoZIz	i0CAQYFK4EEACIDYgAEZn6	R6Hmai2vbtf/FzMv	/bVJOm7TMt/5oReJWiOhR/	AR42aLEIkuxT2QkEOi3aEROo	hGw41akW	1
						J
				Save	e And Contin	iue

STEP2 - Install magma-access-gateway.postinstall



root@ip-192-168-51-193:/home/ubuntu# magma-access-gateway.post-install
Magma AGW Post-Install: Starting Magma AGW post-installation checks
Magma AGW Post-Install: Checking network interfaces configuration
Magma AGW Post-Install: Checking eth0's internet connectivity
Magma AGW Post-Install: Checking whether required services are running
Magma AGW Post-Install: Checking whether required packages are installed
Magma AGW Post-Install: Checking whether Root Certificate exists
Magma AGW Post-Install: Checking Control Proxy configuration
Magma AGW Post-Install: Checking AGW connectivity with Orchestrator
Magma AGW Post-Install: Magma AGW post-installation checks finished successfully.
root@ip-192-168-51-193:/home/ubuntu#

STEP3 –Confirm AG with Magma Orchestrator (Optional)



Check the AGW status by clicking on the gateway ID

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*	mygateway						Health • Good		Last Check in 15/6/2022, 3:57:4	7 p. m.	сри (2%	Jsage				
0	Gateway ID gateway1						Event Aggregation		Log Aggregation		CPE N	Ionitoring	1			
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Deploy SRS LTE



Onboarding srsLTE to OSM



- We start creating the packages
 - \$ osm nfpkg-create srs-lte-enb_vnfd.tar.gz
 - \$ osm nspkg-create srs-lte-enb_nsd.tar.gz

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SDN Controller	magma_agw_ns	a40373dd-6a68-4559-b01e- c2263101a47d	1.0	ETSI OSM	Magma AGW PNF	4 🚓 🗈 Action -	SDN Controller	magma_agw_pnf	b3440018-5ba9-485f-be7b- 1279e2a6d4b5	1.0		pnfd	PNF entry for a Magma AGW	🚠 🖹 Action -
VIM Accounts	magma_orc_cnf_ns	7ddb5e05-fa4f-4c58-9ade-50dbf493	310 1.0	Canonical	NS with 1 KDU connected to the mgmtnet VL	Action -	VIM Accounts	magma_orc_cnf	c9517635-a813-44f6-b235-f10d4fff906	5 1.0	Canonical		K8s container deployment of Magma Orchestrator	🚓 🖀 Action -
* K8s •	srs-ite-enb_nsd	2303d8dc-4be4-41b9-9a33-f0c9ca7e	6322 1.0	ETSI	srsLTE connected to PNF Gateway	A 🚠 🖲 Action -	* K8s >	srs-ite-enb_vnfd	1df86aed-9781-43cb-8229-e8132e7c9b	ac 1.0	ETSI	vnfd	stsLTE VDU	🚓 🗐 Action -
OSM Repositories							OSM Repositories							
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Deploy (Instantiate) the eNB



• Execute the command (Takes some time to deploy the enb instance)

\$ osm ns-createns_	name enbnsd_	_name srs-lte-enb_	_nsdvim_	_account aws-site \
config "{vld: [

```
{name: mgmt, vim-network-name: subnet-098c0d6260c1f0a95 }
],
additionalParamsForVnf: [
```

```
{member-vnf-index: 'srsLTE',
   additionalParams: {
     bind_address_subnet: '192.168.32.0/19',
     mme_addr: '192.168.34.52',
     enb_mcc: '722',
     enb_mnc: '17'}}]}"
```

untu@ip-192-168-32-40:~\$ osm ns-createns_name enbnsd_name srs-lte-enb_nsdvim_account aws-site \
config "{vld: [
<pre>{name: mgmt, vim-network-name: subnet-098c0d6260c1f0a95 }</pre>
],
additionalParamsForVnf: [
<pre>{member-vnf-index: 'srsLTE',</pre>
additionalParams: {
bind address subnet: '192.168.32.0/19',
mme addr: '192.168.34.52',
enb_mcc: '722',
enb_mnc: '17'}{]}"
aa3120-d1b3-4bb6-ba4d-6ac3797d4a68
untu@ip-192-168-32-40:~\$

NS Instances					🖌 New NS
🕓 init 🔮 running / configu	ured 😢 failed 💉 scaling				Entries 10 🖨 🤁
Name	^ Identifier	State	\Rightarrow Operational Status \Rightarrow	Config Status	Actions
Name	Q Identifier	Q Nsd name	Q Select 💠	Select Detailed Status	Q.
enb	a32d291f-ae4e-46d5-8031-8166c2c1c910	srs-Ite-enb_nsd	Ø	✓ Done	🐼 🔟 👬 🛈 Action 🕶
magma_agw_ns	9b4f8c53-98b7-4455-b91d-c6a52ffa0954	magma_agw_ns	0	One Done	🐼 🖃 🏤 🛍 Action -
magma_orc_cnf_ns	898e9ce1-f59b-4fea-a309-4a4022e766c5	magma_orc_cnf_ns	I	✓ Done	🐼 😐 🏤 🛈 Action 😁

Attach UE to Magma (from CLI)



• The attachment of users is a Day-2 OSM action

Execute the command

\$ osm ns-action enb --vnf_name "srsLTE" --vdu_id srsLTE-vdu --action_name attach-ue --params '{
 usim-imsi: "72217000000008",
 usim-k: "00112233445566778899aabbccddeeff",
 usim-opc: "63bfa50ee6523365ff14c1f45f88737d"
 }'

Output:bbb7becc-4a2b-456e-b733-940e829da171

• We can also attach users through the OSM dashboard (UI)

Attach UE to Magma (from UI) (1/4)



• Select "Exec primitive" on the eNB instance on OSM web GUI



Attach UE to Magma (from UI) (2/4)

• Select "VDU Level", VNF Profile ID, VDU primitive and Add Primitive params with the previous UE values, the execute:

Attach UE to Magma (from UI) (3/4)

• Check the History on the enb NS instance:

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\leftrightarrow \rightarrow O \blacktriangle No segure	o https://ui.184.73.40.173.nip.io/instances/ns/history-operatio	ons/a32d291f-ae4e-46d5-8031-8166c2c1c910		A ⁶ 86 8	G @ @ G ⊈	G S 🏐 …
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				OSM Ven	sion 9.0.0.post60 陆 Projects (admin) 🔹 🕒 User (admin) 👻
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PDU Instances	03254a30-ded8-414d-b2e9-624bdd99eda2	action	0	Jun-15-2022 16:44:03	Jun-15-2022 16:44:11	i
NetSlice Instances	ce05193f-1bae-445c-a286-504f6f1677b1	action	0	Jun-15-2022 16:52:46	Jun-15-2022 16:52:46	i
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PDU Instances	03254a30-ded8-414d-b2e9-624bdd99eda2	action	Ø	Jun-15-2022 16:44:03	Jun-15-2022 16:44:11	i
NetSlice Instances	ce05193f-1bae-445c-a286-504f6f1677b1	action	0	Jun-15-2022 16:52:46	Jun-15-2022 16:53:05	i
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Attach UE to Magma (from UI) (4/4)

• Check the UE connected on the Magma Orchestrator:

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::	mygateway		Health • Good		Last Check in 16/6/2022, 6:54:53	3 a. m.	CPU Usage 1%		
	Gateway ID gateway1		Event Aggregation Enabled 		Log Aggregation Enabled 		CPE Monitoring Disabled		
*	Hardware UUID 7bee1da2-2152-4fec-8c6b-fc69a1f2f07c		Connected eN	odeBs				C Autor	efresh
0	Version 1.7.0-1648117787-73e61141		Name	Serial Number	Health	MME	IP Addr	ess ,	Actions
~	Events								
Ø	Timestamp Stream Name E	vent Type			No records to d	isplay			
	Request named with status code 500 C						۲< ۲	∂-0 of 0 >	×
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	5 rows 👻 🖂		Name		Subscriber ID		Service		
			IMSI7221700000000	08	IMSI72217000000008				
8									

One step forward (1/4)

92-168-32-40:~\$ osm vnf-list

name | ns id

ip address

54.80.0.209

192.168.51.193

Access one active UE

• Description: Access a UE and generate traffic to a web site or simply ping

898e9ce1-f59b-4fea-a309-4a4022e766c5

9b4f8c53-98b7-4455-b91d-c6a52ffa0954

it.

- osm vnf-list
- ssh 54.80.0.209
- User: Ubuntu
- Pass: osm2022
- Check tun srsue

ip-192-168-37-34:~\$ ifconfig lags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 9001 'lags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 9001
inet 192.168.37.34 netmask 255.255.224.0 broadcast 192.168.63.255
inet6 fe80::c72:2dff:fe8f:eea9 prefixlen 64 scopeid 0x20<link>
ether 0e:72:2d:8f:ee:a9 txqueuelen 1000 (Ethernet)
RX packets 127182 bytes 169027247 (169.0 MB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 20358 bytes 2240396 (2.2 MB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

vnf member index

magma orc cnf

srsLTE

vnfd name

nagma_orc_cnf

vim account id

- eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 9001
 inet 192.168.181.152 netmask 255.255.255.0 broadcast 192.168.181.255
 inet6 fe80::ce3:99ff:fed1:a0f7 prefixlen 64 scopeid 0x20<link>
 ether 0e:e3:99:d1:a0:f7 txqueuelen 10000 (Ethernet)
 RX packets 137 bytes 5864 (5.8 KB)
 RX errors 0 dropped 0 overruns 0 frame 0
 TX packets 143 bytes 8062 (8.0 KB)
 TX correct 0 dropped 0 overruns 0 corrige 0 colligions 0
 TX packets 143 bytes 8062 (8.0 KB)
 TX correct 0 dropped 0 overruns 0 corrige 0 colligions 0 TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
- lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
 inet 127.0.0.1 netmask 255.0.0.0
 inet6 ::1 prefixlen 128 scopeid 0x10<host>
 loop txqueuelen 1000 (Local Loopback)
 RX packets 59414169 bytes 1766181415291 (1.7 TB)
 FX packets 0 desegoed 0 everyons 0 frame 0 RX errors 0 dropped 0 overruns 0 frame 0 TX packets 59414169 bytes 1766181415291 (1.7 TB) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
- RX packets 0 bytes 0 (0.0 B) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 0 bytes 0 (0.0 B)

One step forward (2/4)

Access one active UE

• Check the rr.conf file to get the Cell ID and TAC to configure on Magma-Orc

One step forward (3/4)

• Detach specific UE

 Description: The current deployment with the detach action, removes all the active users. The detach_specific_ue action could detach a specific UE based on its IMSI number.

Perform Action		8
Primitive Type*	VDU Level Primitive	•
VNF Profile ID *	srsLTE 💌	
Select VDU *	srsLTE-vdu	•
Primitive*	detach-ue	-

yaml	\$	Read only mode (Currently Off)
30	config-primitive:	
1	- name: attach-ue	
2	execution-environ	ment-ref: srs-enb-ue-ee
3	parameter:	
34	- data-type: STRI	NG
5	name: usim-imsi	
6	- data-type: STRI	NG
7	name: usim-k	
8	- data-type: STRI	NG
9	name: usim-opc	
0	- name: detach-ue	
1	execution-environ	ment-ref: srs-enb-ue-ee
2	id: srsLTE-vdu	
3	execution-environme	nt-list:
4	- id: srs-enb-ue-ee	
5	juju:	
6	charm: srs-enb-	ue
7	proxy: false	
8	config-access:	

home/mdaloitsis/srs-lte-enb_vnfd/c	harms/srs-enh-ue	*charm.py 😳 actions.yaml 😳
		1 # Copyright 2020 David Garcia
Name	Size (KB)	¹ 2 # See LICENSE file for licensing details.
C		3 #
venv		4 # This is only an example, and you should edit
tests		5 # If you don't need actions, you can remove th
templates		6 # It ties in to the example _on_fortune_action
src		7 attach-ue:
hooks		8 description: Attach User Emulator to enodeB
run_tests	1	9 params:
requirements.txt		10 usim-imsi:
requirements-dev.txt		j 11 description: "USIM IMSI"
		j 12 type: string
manifest vaml		13 usim-k:
	34	14 description: "USIM K"
dispatch		15 type: string
config.vam	1	16 usim-opc:
charmcraft.yaml	1	17 description: "USIM OPC"
actions.yaml	1	18 type: string
		19 required:
		20 - usim-imsi
		21 - usim-k
		22 - usim-opc
		23 detach-ue:
		24 description: "Detach from AGW."
		25 remove-default-gw:
		26 description: "Remove default gateway"

One step forward (4/4)

• Detach specific UE

 Description: The current deployment with the detach action, removes all the active users. The detach_specific_ue action could detach a specific UE based on its IMSI number.

Conclusions (1/2)

Conclusions (2/2)

Thank you!

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