



nmaas Virtual NOC at RENATER

37th STF hosted by RedIRIS / Madrid

February 10th 2026

Agenda

- Rationale
 - Historical context
 - Technological context
 - Future project requirements
- Wishlist
 - Limited man power
 - KISS: Automate & Orchestrate
 - Anticipate future needs
- Foundational sub-projects
 - Source of truth
 - CI/CD
 - GitOps
 - Workflow engine
- New use cases
- Key take-away
- Demos, Q&A



Rationale

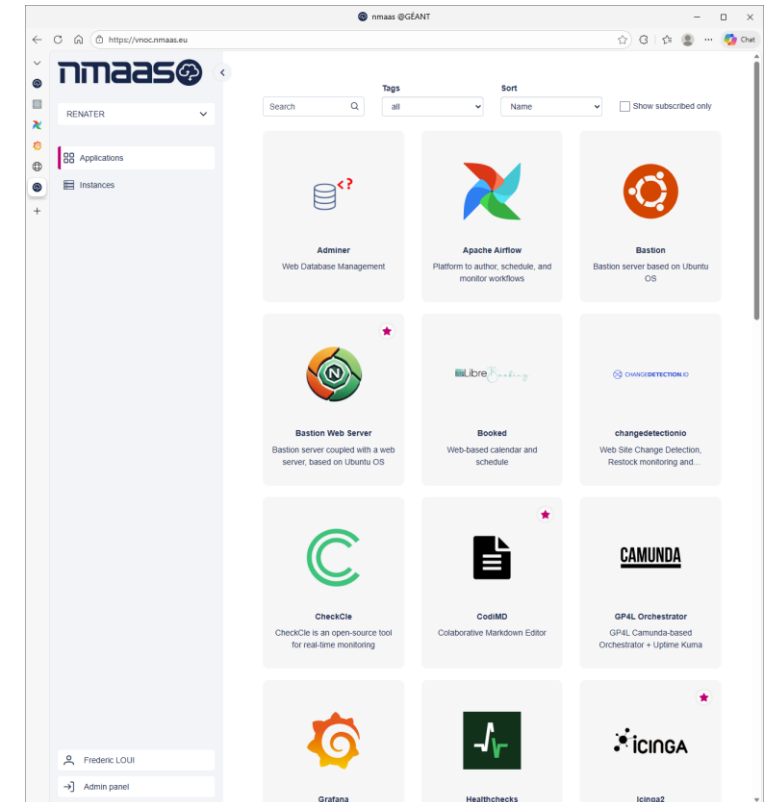
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nmaas: Celebrating almost 10 years !



- 2015: New Idea form
- 2016 - 2018 GN4-2: Incubating project
- 2018 - version v1.0.0 released in production
- 2019 - 2022 GN4-3: nmaas in production
- 2022 - published as open-source
- 2023 - 2024 GN5-1:
 - nmaas re-branding,
 - introduction of Virtual NOC
 - Virtual LAB use-cases
- 2024 - Support for Virtual LAB (v1.6.0)
- 2025 - now GN5-2: nmaas use-cases
- September 2025
 - Remote cluster support (v1.8.0)
 - Webhooks !





<https://nmaas.eu>

Rationale: historical context

- In 2017: 40 servers were acquired
 - perfSONAR beacons
 - Other NFV workload
 - ➔ WMWare ESXI-6 hypervisors
 - 2025: Observations
 - Around 10 servers were deployed
 - No software alignment (ESXI, IDRAC, BIOS, perfSONAR image)
 - Security issues (local heterogeneous login/password for iDRAC, OS, etc.)
 - perfSONAR service globally was not working
- ➔ How to improve this situation ?
- ➔ How to take advantage of this platform unfortunate context ?

Rationale: Technological context

- In 2023: Broadcom acquired VMWare
 - ESXI is no more free
 - No more perpetual license, and License price x1
 - End of 2025, ESXI 8 license became free again but with limitation
 - ➔ Trust is lost
- 2025:
 -  Kubernetes maturity
 - Pods/Container networking wide adoption
 - Kubernetes one line installation
 - Super strong community support
 - Lots of materials, documentation
 - Very interesting approach: Immutable Kubernetes 
 - Devops method adoption
 - Source of truth
 - Gitops
 - Declarative approaches in order to deploy workload

Rationale: Future project requirements

- 2025: EURO-HPC JU
 - Performance measurement requirements
 - To a certain extent participant should be MANRS compliant
- 2025: Network Management tools complete overhaul
 - Old in house developed tools that show sign of limitation
 - Requiring manual maintenance
 - Delay in reflecting changes
 - Lack of accuracy
 - Not ready, without additional development effort to add/integrate new features
 - Automation required
 - At NREN business level
 - At technological level
 - Simplicity is a key factor to foster adoption



Wishlist

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Wishlist ...

- Limited man power
 - Automate what we must
 - Eliminate manual intervention
 - Improve efficacy and accuracy
 - Orchestrate where we can
 - Break silos between teams
 - Enable clear boundary between business processes
- KISS method but ...
 - KISS for targeted user
 - Keep complexity for "us"
- Anticipate future needs
 - Experiences showed that we you progress
 - Gradually new and unexpected requirement pops up




Foundational sub-project

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Foundational sub-projects

- Source of truth
 - Source of truth inventory (netbox)
 - Source of truth consolidation (maat usage under study)
 - Data storage is not always the Source of truth
 - CI/CD
 - Provide answers to recurrent questions
 - Up to date data on a daily basis
 - GitOps
 - Declarative approach
 - Reconciliation
 - Workflow engine
 -  Airflow
- No (significant) development required → Don't reinvent the wheel
- Integration only → KISS

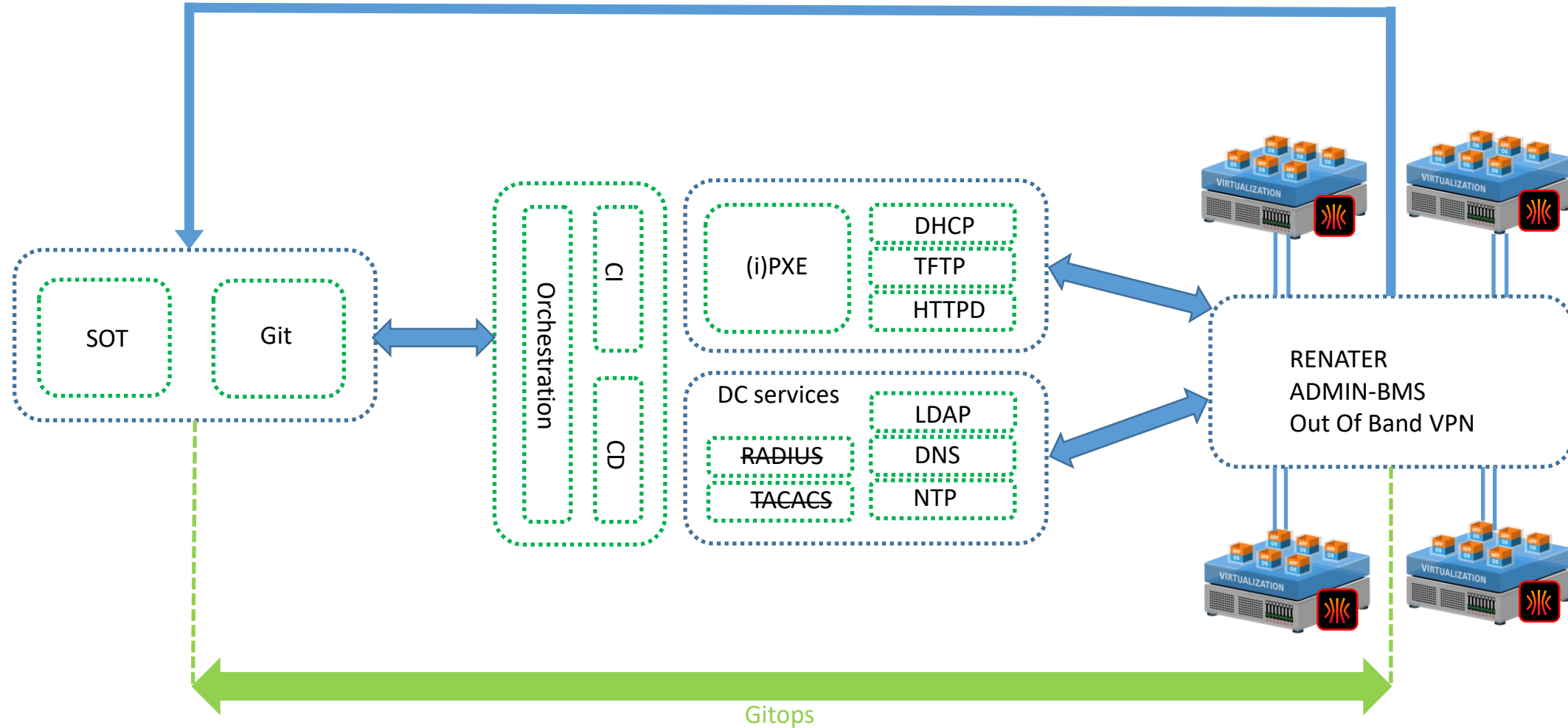


Platform architecture

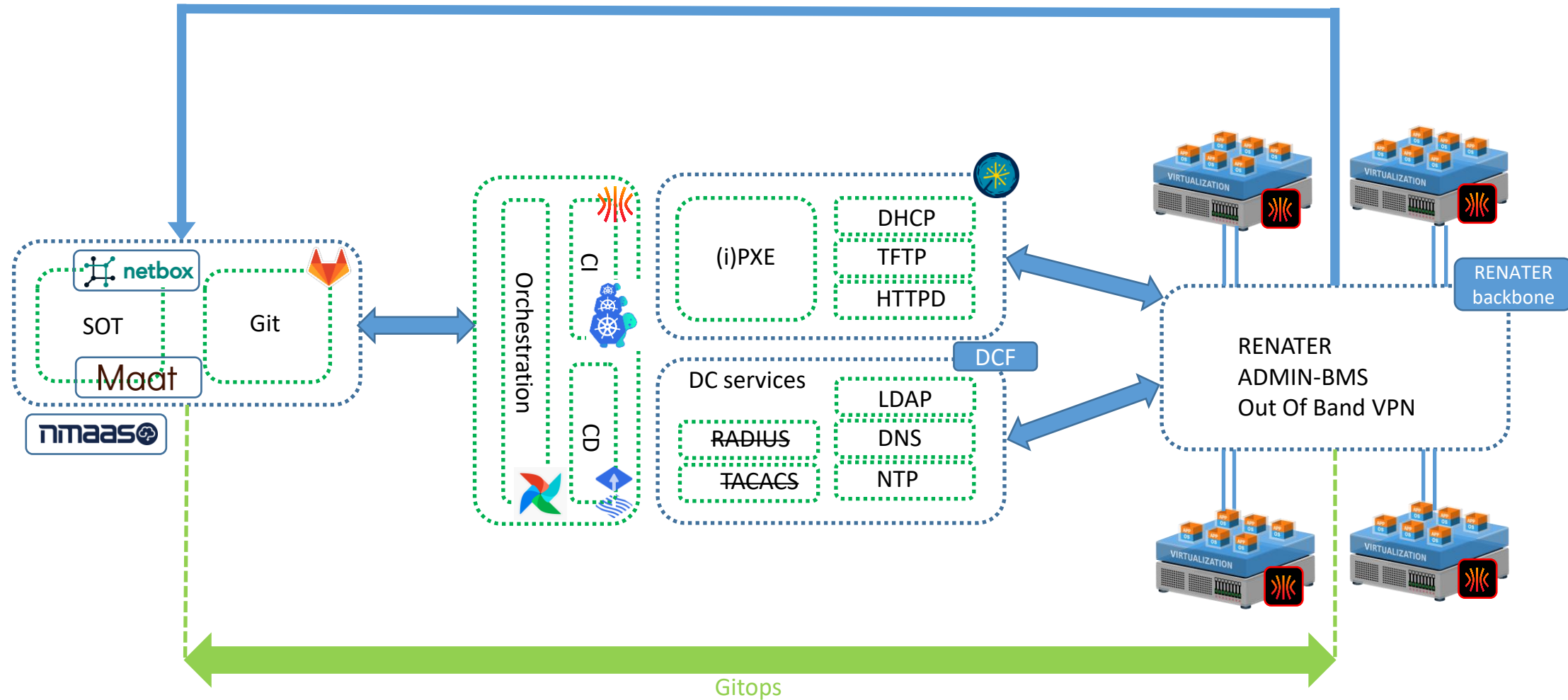
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Platform overall architecture



Platform overall architecture





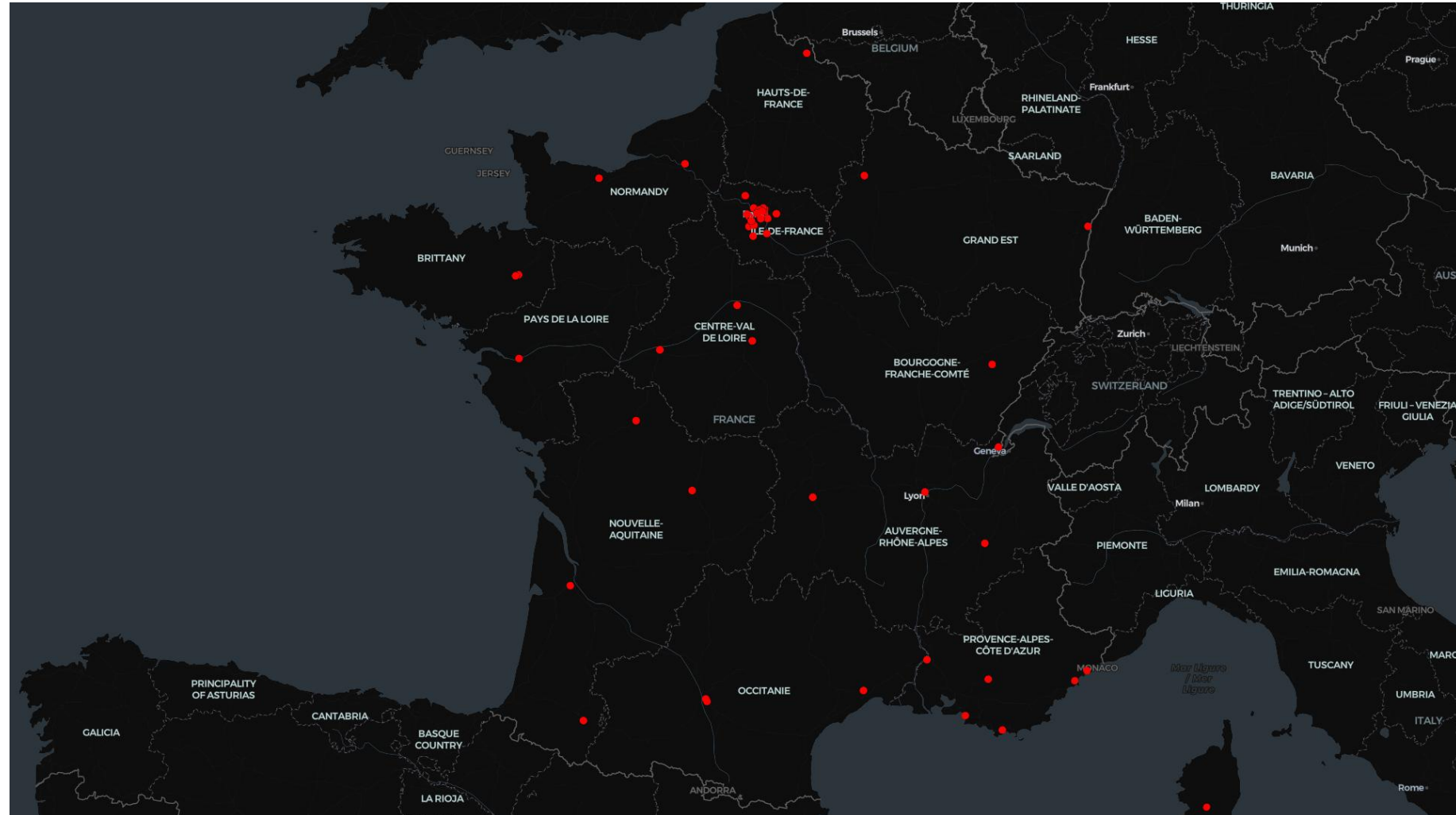
Platform usage overall architecture

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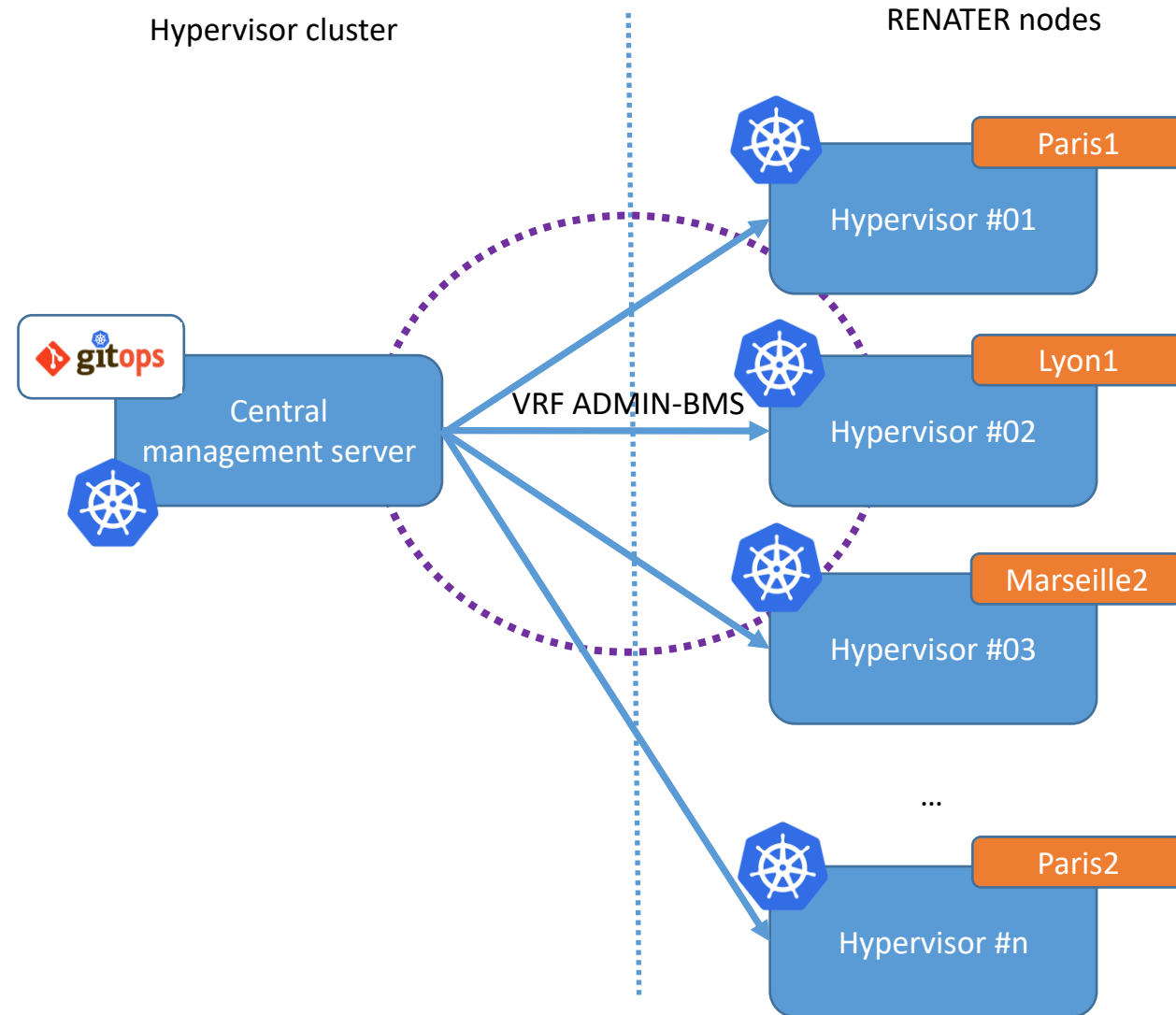
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Overall vision

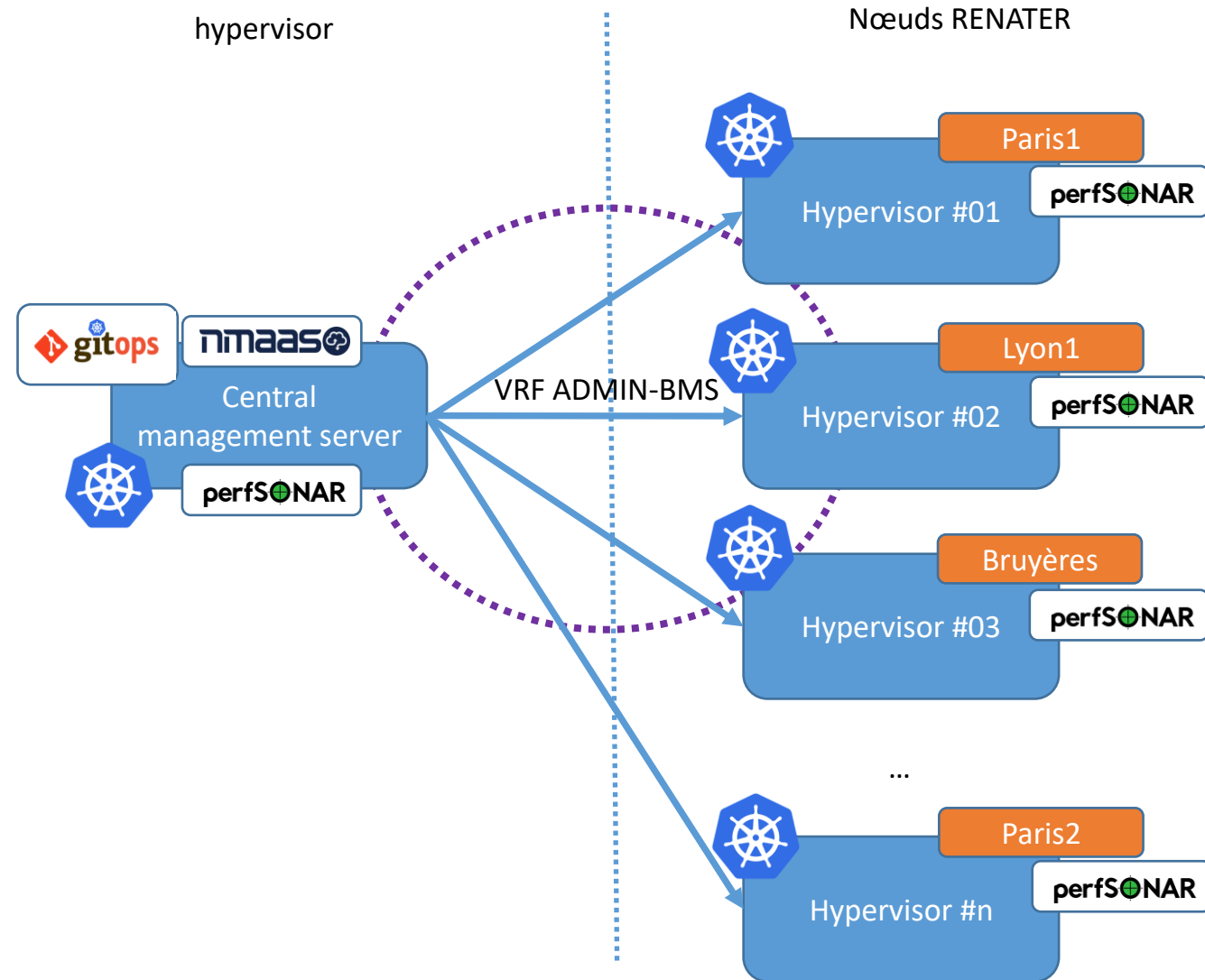
- **Edge computing**
 - Intelligence in POP
 - distributed
 - In RENATER POP
- **Appliance de type NFV**
 - Idempotent
 - No persistent local storage
- **Deployment**
 - KISS
 - Via federated portal
 - Distinction between OOB & Inband
 - SoT
- **Declarative approach**
 - Centralised
 - Versionned
 - Reconciliation optional



Underlying infrastructure: BMS



1st use case: PerfSONAR



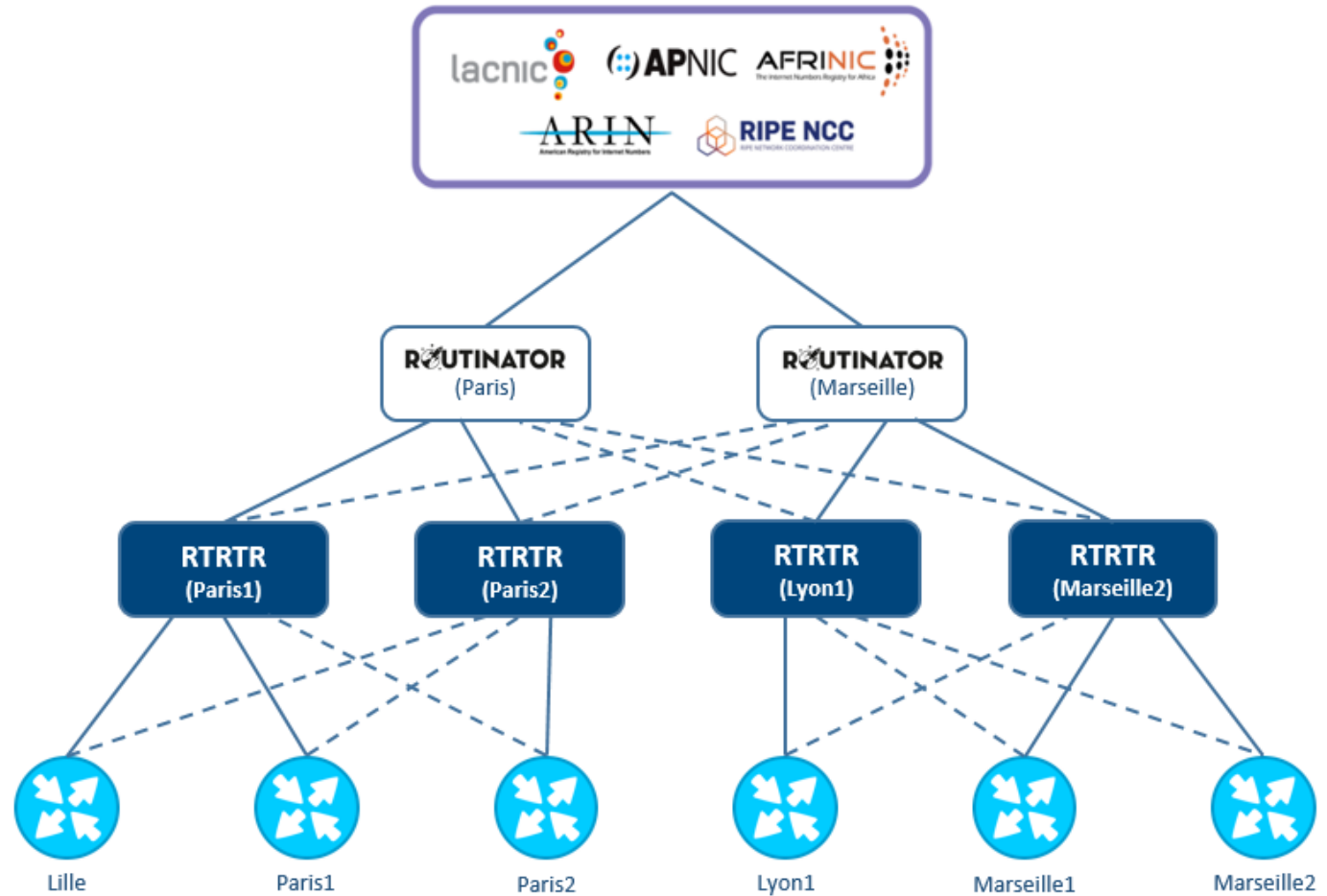
2nd use case: ROV/RPKI

Trust Anchor Locators (TALs)

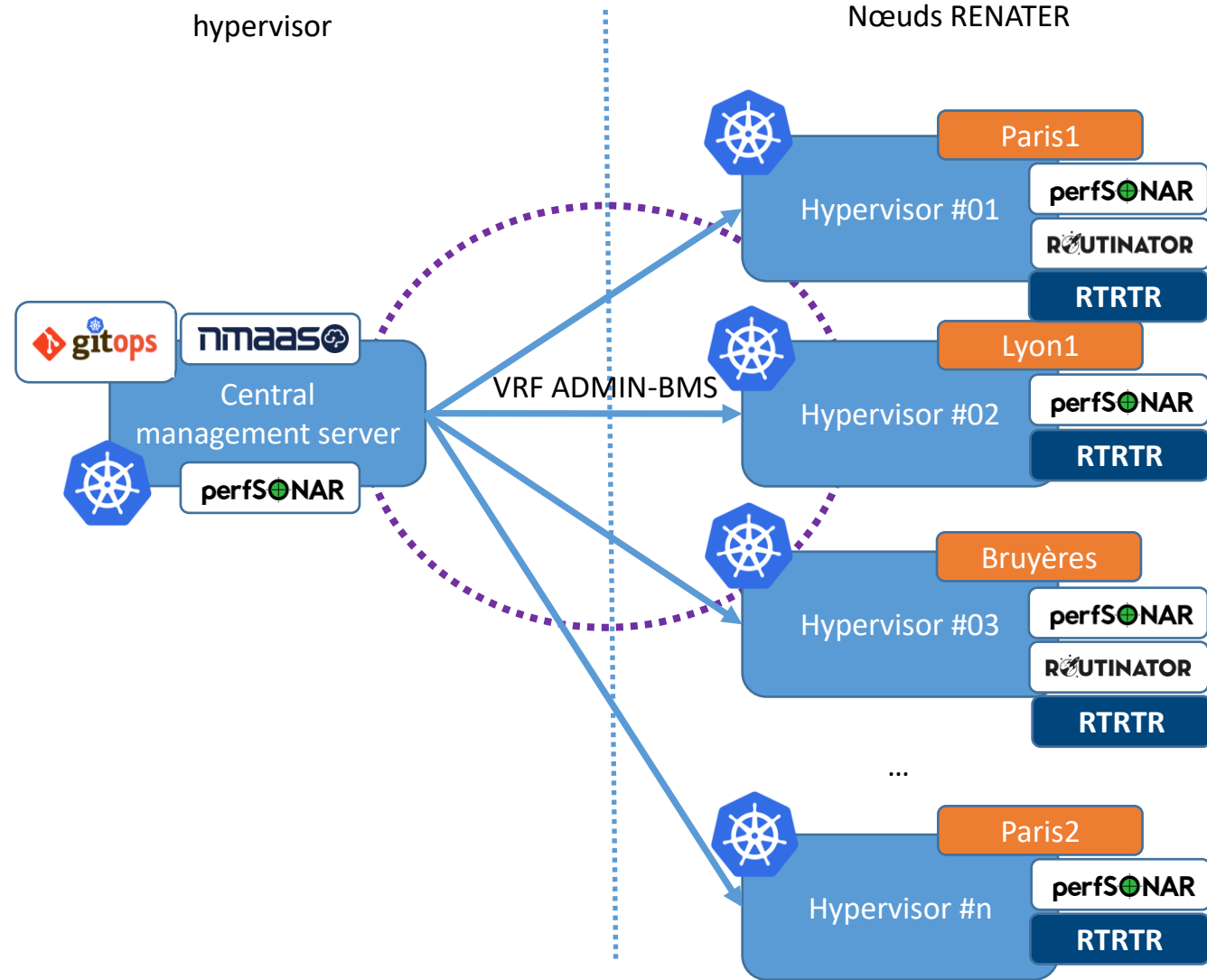
Validators

Proxies

ASBRs



2nd use case: ROV/RPKI





SNMP exporter High availability

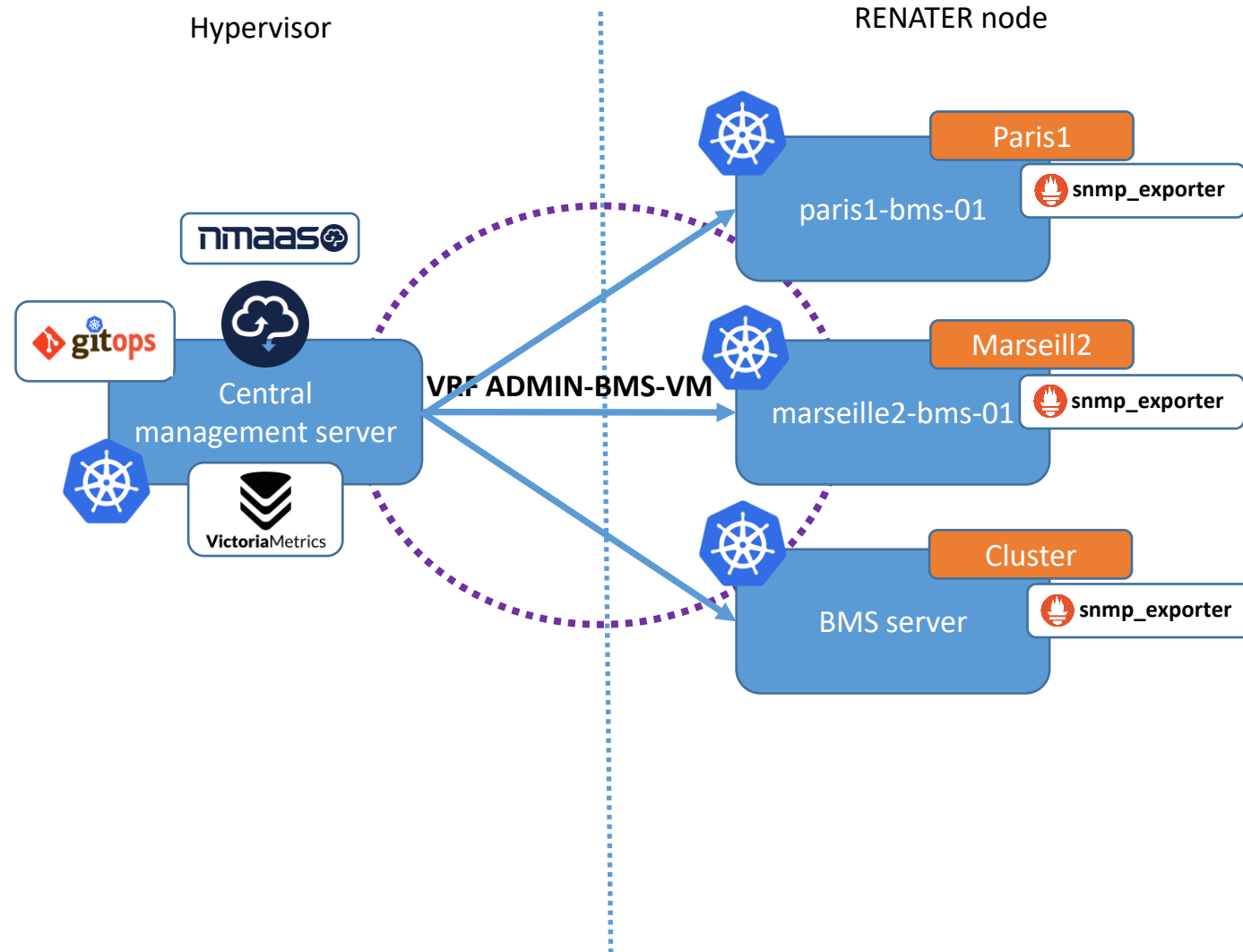
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SNMP polling strategy

- Geographical zone definition (North/South)
 - Netbox declaration in netbox via tags
 - Usage of "device" view)
- 2 snmp_exporter:
 - Active-active load sharing
 - North-South active-backup

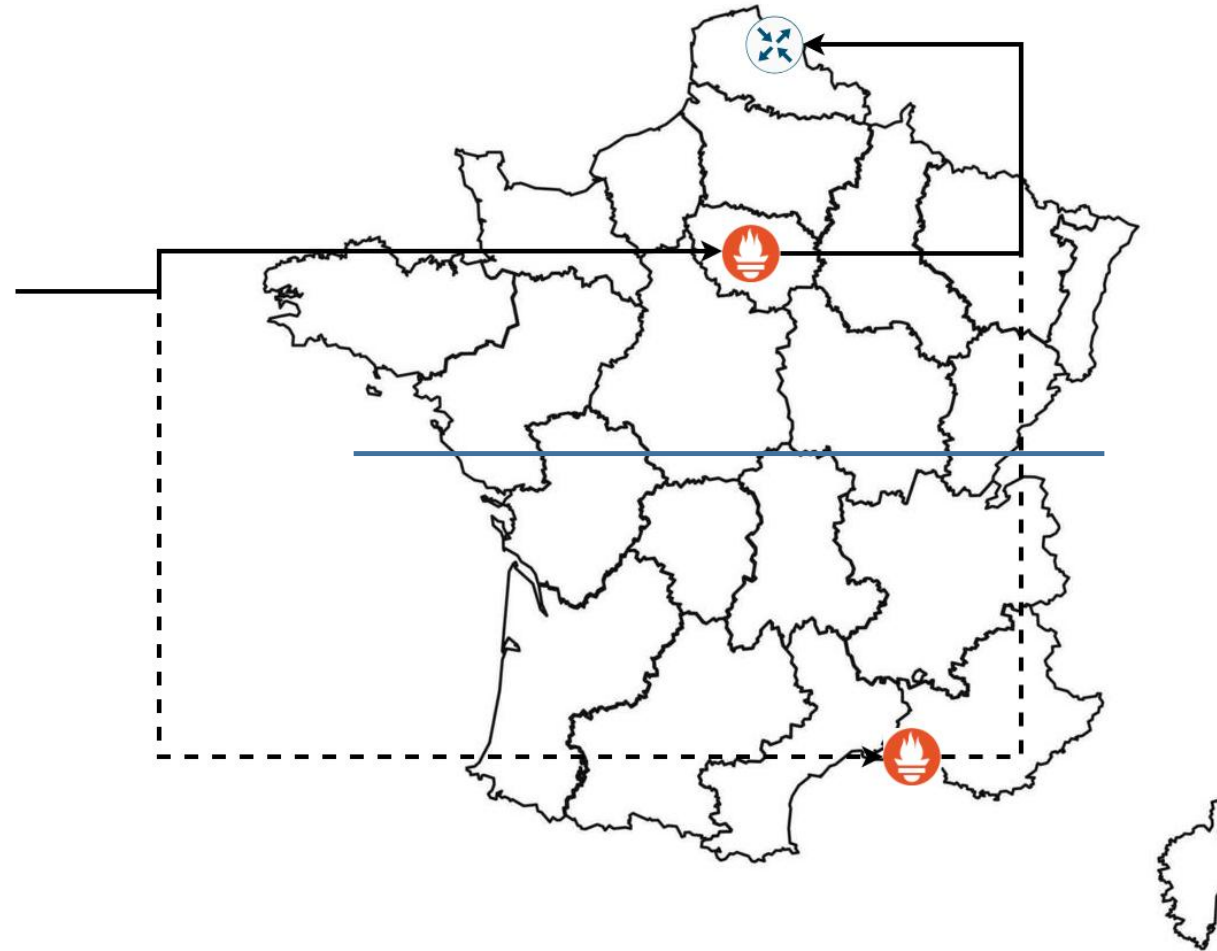
snmp_exporter distributed architecture



Distributed active-active north south architecture load sharing



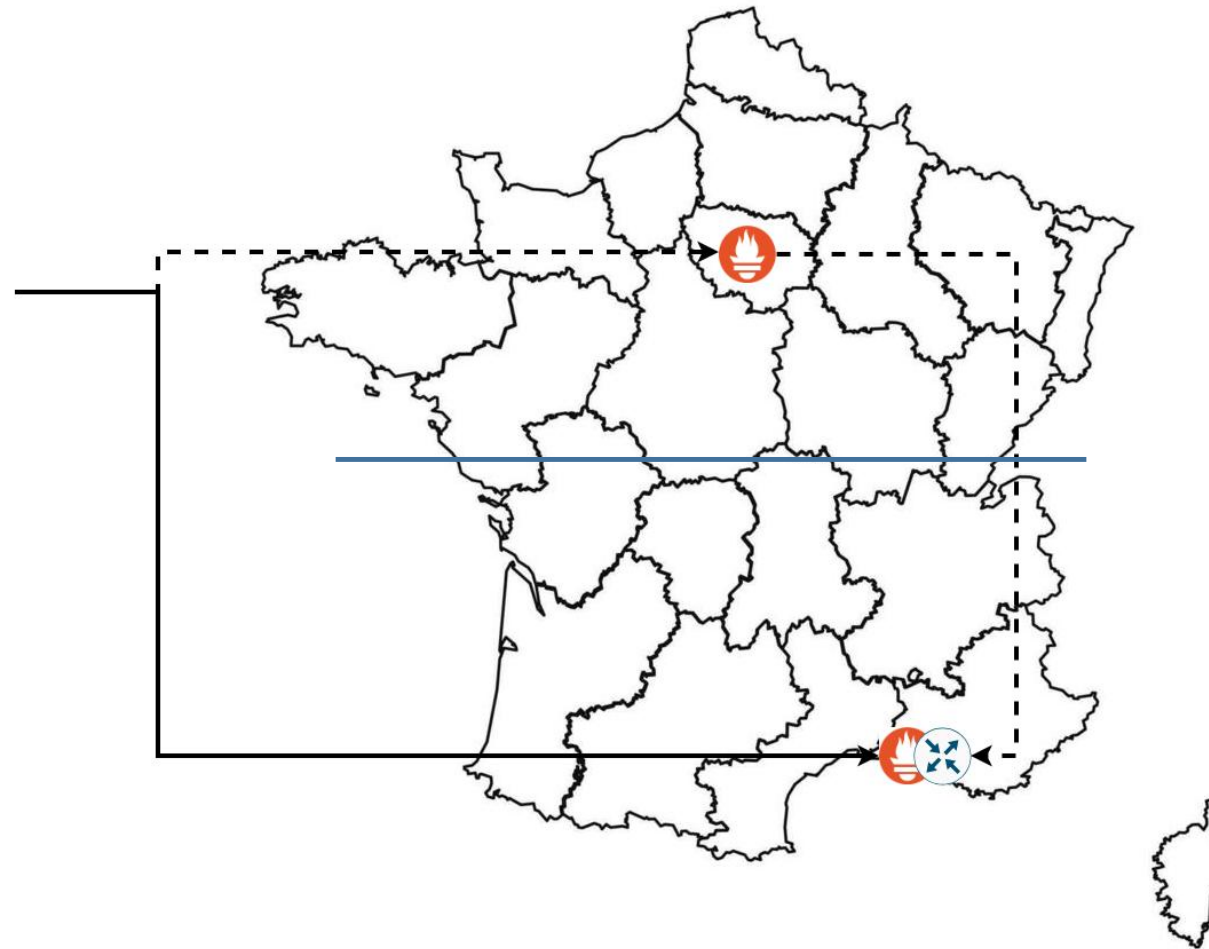
ren-nr-lille-rtr-091



Distributed active-active north south architecture load sharing



ren-nr-marseille2-rtr-091











New use cases

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New projects, ideas ...

Horizon 2026 - 2027

- BGP/IGP monitoring
 -  Icinga
 -  VictoriaMetrics
 -  Prometheus
 - BMP
- Security use case
 - New DPI beacons
 - Network events collectors
- Distributed storage
 - Object storage: Garage-HQ, MinIO
 - Distributed storage: IPFS
-  deployment on BMS
 - Usage of  Tinkerbell
- Network Management use case
 -  pour regional network/user R&E community ?
 - Network configuration automation (new source of truth)
 - GNMI exporter: GNMIC
 - Netflow collection data aggregation for SOC forensics










Key take-away

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Key take-away



-  vnoc is the tip of the iceberg but ...
 - It is envisioned to be the central point
 - From which business workflow are triggered
-  Airflow is the workflow engine
 - That is the glue between systems (Source of truth, ticketing systems, CRN)
 - Python & declaratively based
 - Easy to learn
-  vnoc interact with underlying platform
 - Set of BMS distributed geographically
 -  Kubernetes based with Kubevirt capability
 -  Talos linux immutable Kubernetes is used
 - Leverage  vnoc capability
 - to stitch  user defined catalog
 - And existing remote cluster
- With such a platform the sky is the limit !



**Lessons learned: Innovation takes time
nmaas team support is incredibly responsive !**

Demos, Q&A ?