ETSI OSM-TFS Integration

New WIM-related features and future OSM+TFS integration plans

Lluis Gifre, Ricard Vilalta (CTTC)
Agenda

- ETSI TeraFlowSDN (TFS) OSG
- Contributions from ETSI TeraFlowSDN OSG
- Experimental Demonstrations
- OSM-TFS Long-term Testbed Proposal
ETSI TeraFlowSDN (TFS) OSG
Do we need YET another Transport SDN controller?

Cloud-native SDN controller for supporting future networks beyond 5G.

Hosted by ETSI and based on results of the European Union-funded TeraFlow 5G PPP research project.

Microservices architecture provides key benefits: Scalability, Self-healing, Integrity.

‘Toolbox’ for ETSI groups working on network transformation.

Supports use cases such as autonomous networks, inter-domain, and cybersecuritv.

Enables the alignment of multi-SDO goals and helping to accelerate standardization cycles.

ETSI TeraFlowSDN to serve as reference implementatioon for Telecom Infra Project.

The source code of TeraFlowSDN is publicly available under the Apache Software Licence.

ETSI OSM-TFS Integration: New WIM-related features and future OSM+TFS integration plans.
ETSI TeraFlowSDN: A growing community

• Members

• Participants (Non-ETSI members)

ETSI OSM-TFS Integration: New WIM-related features and future OSM+TFS integration plans
TFS Release 2 Architecture

ETSI OSM-TFS Integration: New WIIM-related features and future OSM+TFS integration plans
Controlled and managed network elements/domains

- The TeraFlowSDN controller uses its **North-Bound Interface** (NBI) component to receive:
  - **Layer 2 Virtual Private Network** (L2VPN) requests and convert them to necessary connectivity services.
  - **Transport Network Slices** via the Slice and Service components.
- The **Service** component is responsible for selecting, configuring, and deploying the requested connectivity service through the **South-Bound Interface** (SBI).
- The **SBI** component interacts with the network equipment through pluggable drivers.
  - A **Driver API** has been defined to facilitate the addition of new network protocols and data models to the SBI component. Validated drivers include:
    - OpenConfig-based routers.
    - Optical SDN controllers through the Open Networking Foundation (ONF) Transport API (TAPI).
    - Microwave network elements through the IETF Network Topology YANG model.
    - Point-to-Multipoint integration of Infinera XR optical transceivers.
    - Support for P4 routers that includes (i) loading a P4 pipeline on a given P4 switch; (ii) getting runtime information (i.e., flow tables) from the P4 switch; and (iii) pushing runtime entries into the P4 switch pipeline, thus allowing total usage of P4 switches.
Our single point of entry: [https://tfs.etsi.org](https://tfs.etsi.org)

Hackfest #2: 20-21 June 2023, Madrid (Spain). Collocated with IEEE NetSoft

Hackfest #3: 16-17 October, Castelldefels (Spain)

TFS Ecosystem day: 18 October, Castelldefels (Spain)
Bridges to Research – Building the TFS ecosystem

ETSI OSM-TFS Integration: New WIM-related features and future OSM+TFS integration plans

© ETSI CC-BY-4.0
Contributions from ETSI
TeraFlowSDN OSG
## End-2-End Workflow extensions and Bug Fixes

<table>
<thead>
<tr>
<th>Change</th>
<th>Subject</th>
<th>Project</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>#12683</td>
<td>Feature 10954 to automatically select WIMs for inter-datacenter networks</td>
<td>osm/LCM</td>
<td>master</td>
</tr>
<tr>
<td>#13226</td>
<td>Feature 10937: Transport API (TAPI) WIM connector for RO</td>
<td>osm/RO</td>
<td>master</td>
</tr>
<tr>
<td>#11712</td>
<td>Fix bug 1886 to hide WIM password properly in command wim-show</td>
<td>osm/osmcient</td>
<td>v10.0</td>
</tr>
<tr>
<td>#12511</td>
<td>Fix 2152 to hide WIM password properly in command wim-show</td>
<td>osm/osmcient</td>
<td>v12.0</td>
</tr>
<tr>
<td>#12512</td>
<td>Fix 2153 to hide WIM password properly in command wim-show</td>
<td>osm/osmcient</td>
<td>master</td>
</tr>
<tr>
<td>#11731</td>
<td>Fix 1899 to select correct WIM connector class and prevent exceptions with missing parameters</td>
<td>osm/RO</td>
<td>v10.0</td>
</tr>
<tr>
<td>#12523</td>
<td>Fix 2154 to select correct WIM connector class and prevent exceptions with missing parameters</td>
<td>osm/RO</td>
<td>v12.0</td>
</tr>
<tr>
<td>#12525</td>
<td>Fix 2156 to select correct WIM connector class and prevent exceptions with missing parameters</td>
<td>osm/RO</td>
<td>master</td>
</tr>
<tr>
<td>#11732</td>
<td>Fix bug 1902 to resolve issues with IETF L2VPN WIM connector</td>
<td>osm/RO</td>
<td>v10.0</td>
</tr>
<tr>
<td>#12524</td>
<td>Fix 2155 to resolve issues with IETF L2VPN WIM connector</td>
<td>osm/RO</td>
<td>v12.0</td>
</tr>
<tr>
<td>#12526</td>
<td>Fix 2157 to resolve issues with IETF L2VPN WIM connector</td>
<td>osm/RO</td>
<td>master</td>
</tr>
<tr>
<td>#11730</td>
<td>Fix 1901 to encrypt correct WIM account password field and check WIM accounts</td>
<td>osm/NBI</td>
<td>v10.0</td>
</tr>
<tr>
<td>#12509</td>
<td>Fix 2150 to encrypt correct WIM account password field and check WIM accounts</td>
<td>osm/NBI</td>
<td>v12.0</td>
</tr>
<tr>
<td>#12510</td>
<td>Fix 2151 to encrypt correct WIM account password field and check WIM accounts</td>
<td>osm/NBI</td>
<td>master</td>
</tr>
</tbody>
</table>

Design of Feature 10954: [https://osm.etsi.org/pad/p/feature10954](https://osm.etsi.org/pad/p/feature10954)
Design of Feature 10937: [https://osm.etsi.org/pad/p/feature10937](https://osm.etsi.org/pad/p/feature10937)
Experimental Demonstrations

Feature for OSM (under discussion)
Extend IETF L2VPN WIM connector with high availability capacities.
OSM-TFS Long-term Testbed Proposal
OSM-TFS Long-term Testbed Architecture

ETSI OSM-TFS Integration: New WiM-related features and future OSM+TFS integration plans

© ETSI
Network Emulation

https://containerlab.dev/

https://www.gns3.com/

... and many more: https://www.brianlinkletter.com/2023/02/network-emulators-and-network-simulators-2023/
Many containerized Network Operating Systems.

Experts need to run them on demand in user-defined topologies.

Container orchestration tools (e.g., docker-compose) does not fit well with this purpose.

Unable to create connections defining the topology.

ContainerLab:

- CLI for orchestration and managing container-based networking labs
- Starts containers, builds virtual wiring between them.
- Manage labs lifecycle.
- Support for many network device kinds (https://containerlab.dev/manual/kinds/)
- Many examples (https://containerlab.dev/lab-examples/lab-examples/)
ContainerLab - Examples

https://containerlab.dev/

ETSI OSM-TFS Integration: New WiM-related features and future OSM+TFS integration plans

© ETSI
Download and install the latest release (may require sudo)
bash -c "$(curl -sL https://get.containerlab.dev)"

Topology definition

```
name: srlceos01

 topology:
 nodes:
  srl:
    kind: srl
    image: ghcr.io/nokia/srlinux
  ceos:
    kind: ceos
    image: ceos:4.25.0F

 links:
  - endpoints: ["srl:e1-1", "ceos:eth1"]
```
Check that container images are available
$ docker images | grep -E "srlinux|ceos"

REPOSITORY          TAG       IMAGE ID       CREATED        SIZE
ghcr.io/nokia/srlinux latest   79019d14cfc7  3 months ago  1.32GB
ceos                4.25.0F   15a5f97fe8e8  3 months ago  1.76GB

Start the lab deployment
$ mkdir ~/clab-quickstart
$ cd ~/clab-quickstart
$ cp -a /etc/containerlab/lab-examples/srlceos01/* .
$ containerlab deploy --topo srlceos01.clab.yml

Additional Details:
https://containerlab.dev/quickstart/
Connecting to the nodes

$ docker exec -it clab-srlceos01-sr1 bash

$ ssh admin@172.20.20.3
admin@172.20.20.3's password:
Using configuration file(s): []
Welcome to the srlinux CLI.
Type 'help' (and press <ENTER>) if you need any help using this.
--{ running }--[
A:sr1l1#

# Creates /etc/hosts entries so you can use names
$ ssh admin@clab-srlceos01-sr1

Destroying a lab

$ containerlab destroy --topo srlceos01.clab.yml

Additional Details:
https://containerlab.dev/quickstart/
OSM-TFS Long-Term Testbed – Deployment Proposal

ETSI OSM-TFS Integration: New WIM-related features and future OSM+TFS integration plans  © ETSI
Plans after Summer Break

1. Extend automated tests for TeraFlowSDN
   - Automate end-to-end integration tests in CI/CD pipeline
   - Add missing unitary tests

2. Migrate CI/CD pipeline to ETSI HIVE

3. Automate deployment of ContainerLab in automated tests

4. Plan Long-Term Testbed activity
Thank You!