

Federating FEDERICA

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Federating FEDERICA

Proposal to consider various forms of federation:

1. **integrated** (the facilities can be used as one with a inter-domain common control plane)
2. **partially integrated** (only part of the control is exchanged, e.g. calendar, AAA information)
3. **overlay** (each facility just uses the services/resources of the other without a common control plane, just a data plane, there is an exchange of information related to monitoring, faults, and so on)

In any case a **common data plane** must be exists as well as one or more information exchange **protocols** between them

Why Federating FEDERICA

Through Federation FEDERICA may :

- achieve better **scaling** capabilities
- access **different resource types** (e.g. wireless, sensors)
- contribute to a **richer environment** offering to the user
- facilitate (new) **standards** definition, e.g. resource description, protocols, monitoring

Federation should **not make access more complex** to the user, neither exclude **unforeseen uses** of the facilities.

Federating FEDERICA

Given that FEDERICA is based on two main characteristics:

- it creates (virtual) resources and the relations between them **only when they are needed**
- it must **carefully map** the virtual resources to the substrate to ensure the best reproducibility to researchers

the first step for FEDERICA is to federate in the **overlay** model.

It requires:

- an agreed (standard) **resource description** set
- a **common AAI infrastructure, data plane and information exchange protocol** at the **substrate level**

Offering a slice, imposes less configuration complexities to other facilities.

Federating - some key issues

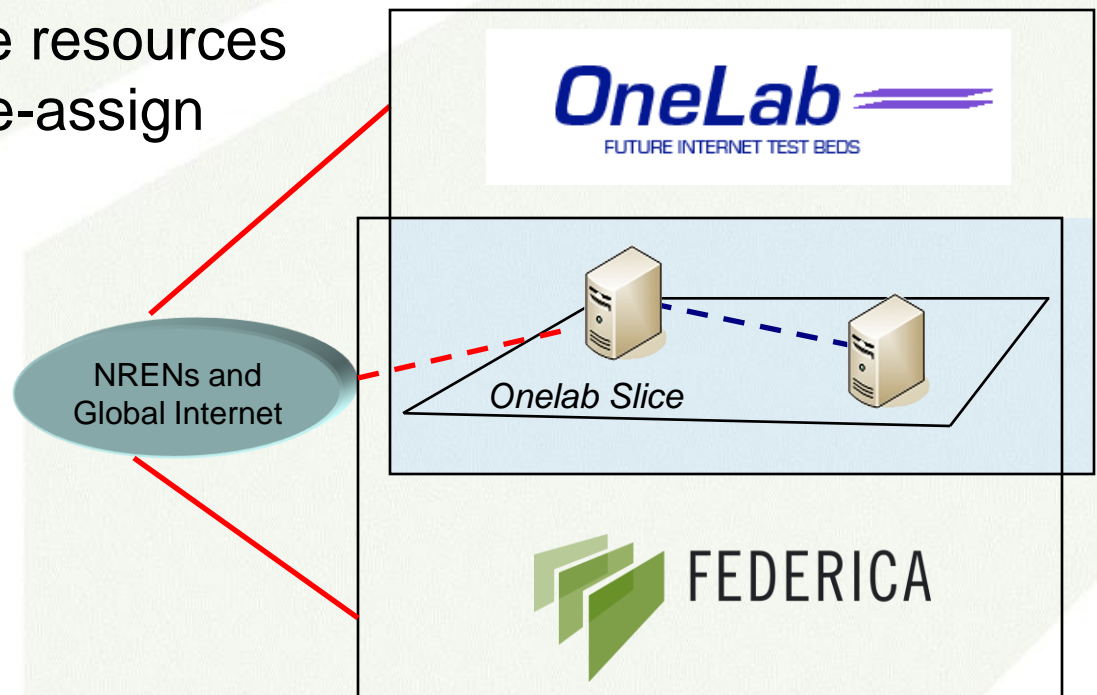
- **reproducibility** of experiments, in particular the amount of **variation** of average values
- **monitoring** and combination of data
- **virtualization** use. How to combine physical resources and virtual resources in a seamless environment
- **signalling** between the (many) **control planes** and ensure the separation between the user control plane and the facility control plane, Fundamental in case of failures
- **standards** for resource and topology description
- checkpointing and error recovery/restart
- **AAI**, **scheduling** and **naming**

FEDERICA-Onelab2 overlay

OneLab (virtual) nodes can be hosted by V-Nodes in a slice. Those nodes have full control of their network interfaces and circuits up to the egress from FEDERICA into Internet. The nodes have then **enhanced** capabilities.

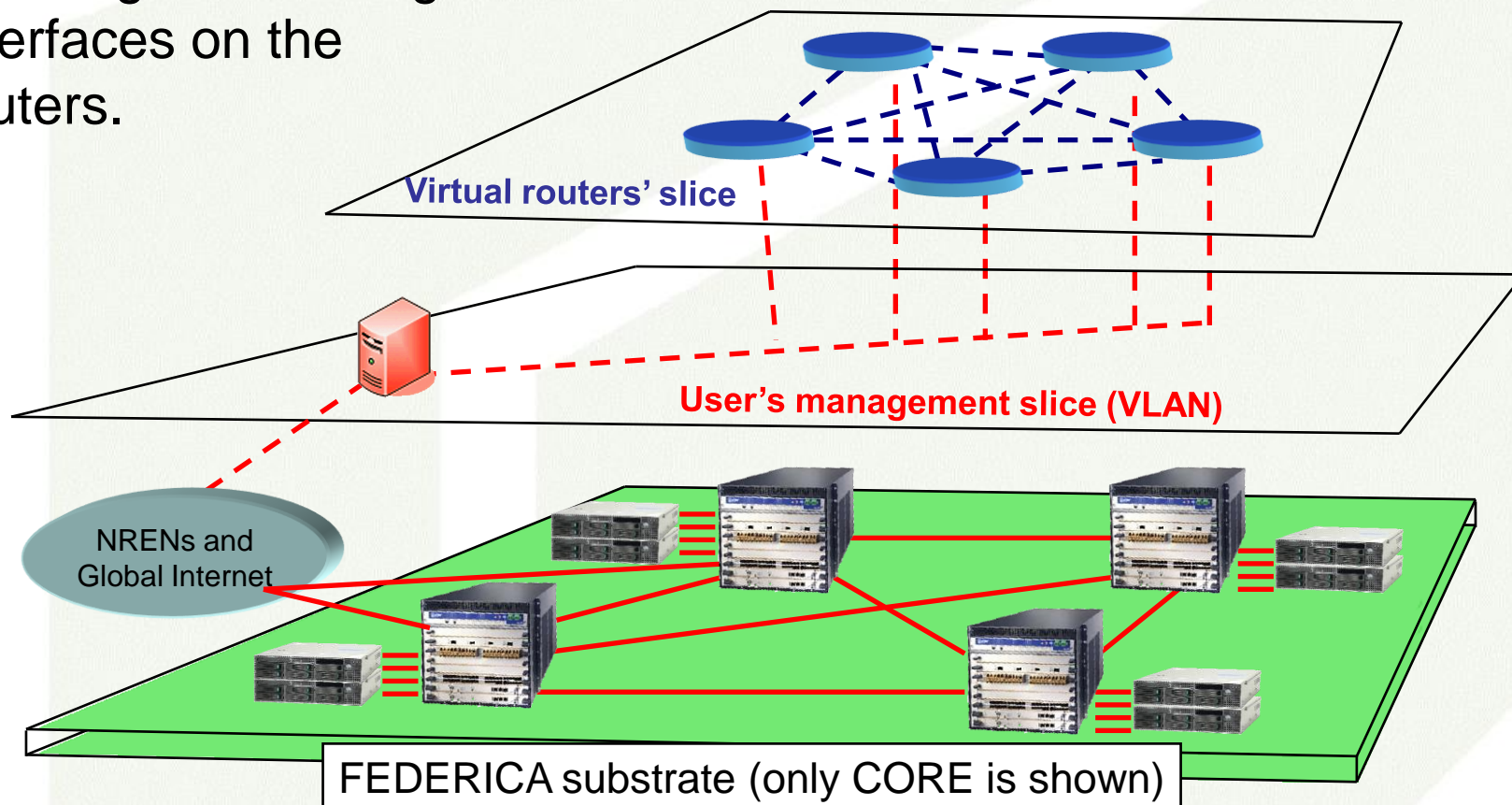
FEDERICA offers these resources to Onelab, which can re-assign them to users

The network topology in the slice can be rich enough to allow the user to choose and modify the test one (see next slide)



Federating slices

FEDERICA can create a slice containing fully meshed routers. The test topology between them can be chosen by the user enabling or disabling interfaces on the routers.



Federating FEDERICA plans

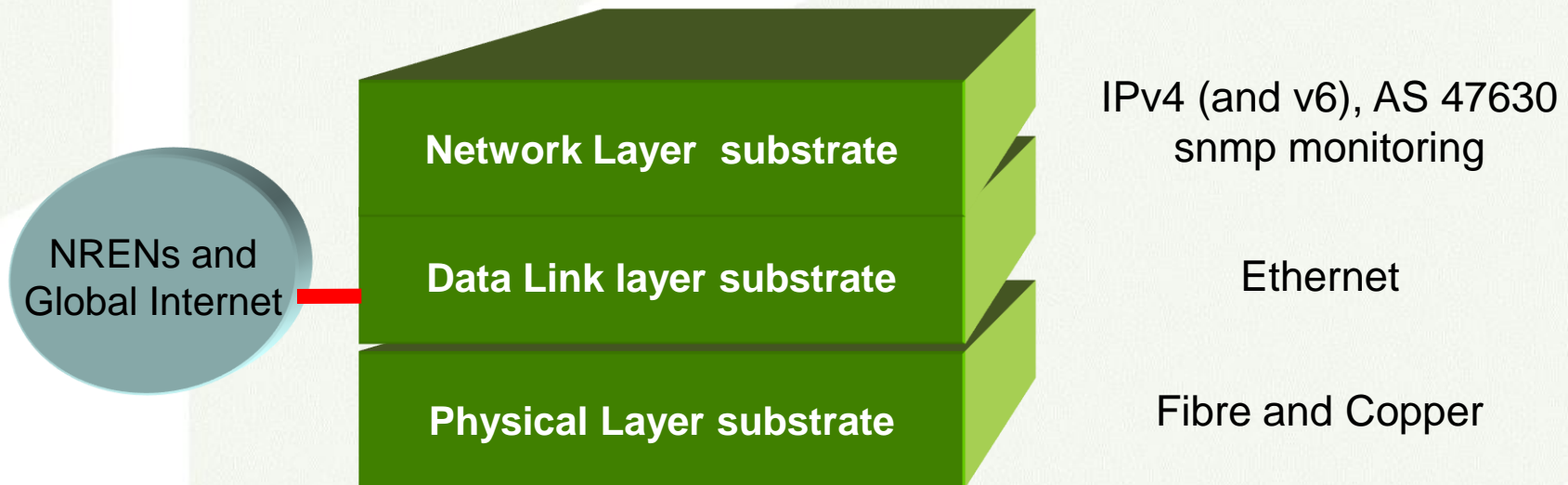
- continue to federate at the slice level in the **overlay** model
 - Consider **brokering slices** (need to understand SLA) and extend collaboration to other projects
 - evaluate challenges of federating at the **substrate level**. The main issue is the **virtual resources mapping to the physical substrate**
 - agree and develop federated **monitoring** and resource **representation**
 - discuss user's requirements for **physical interconnection** including the optical layer
 - and ...
- keep things **simple**

Back-up slides

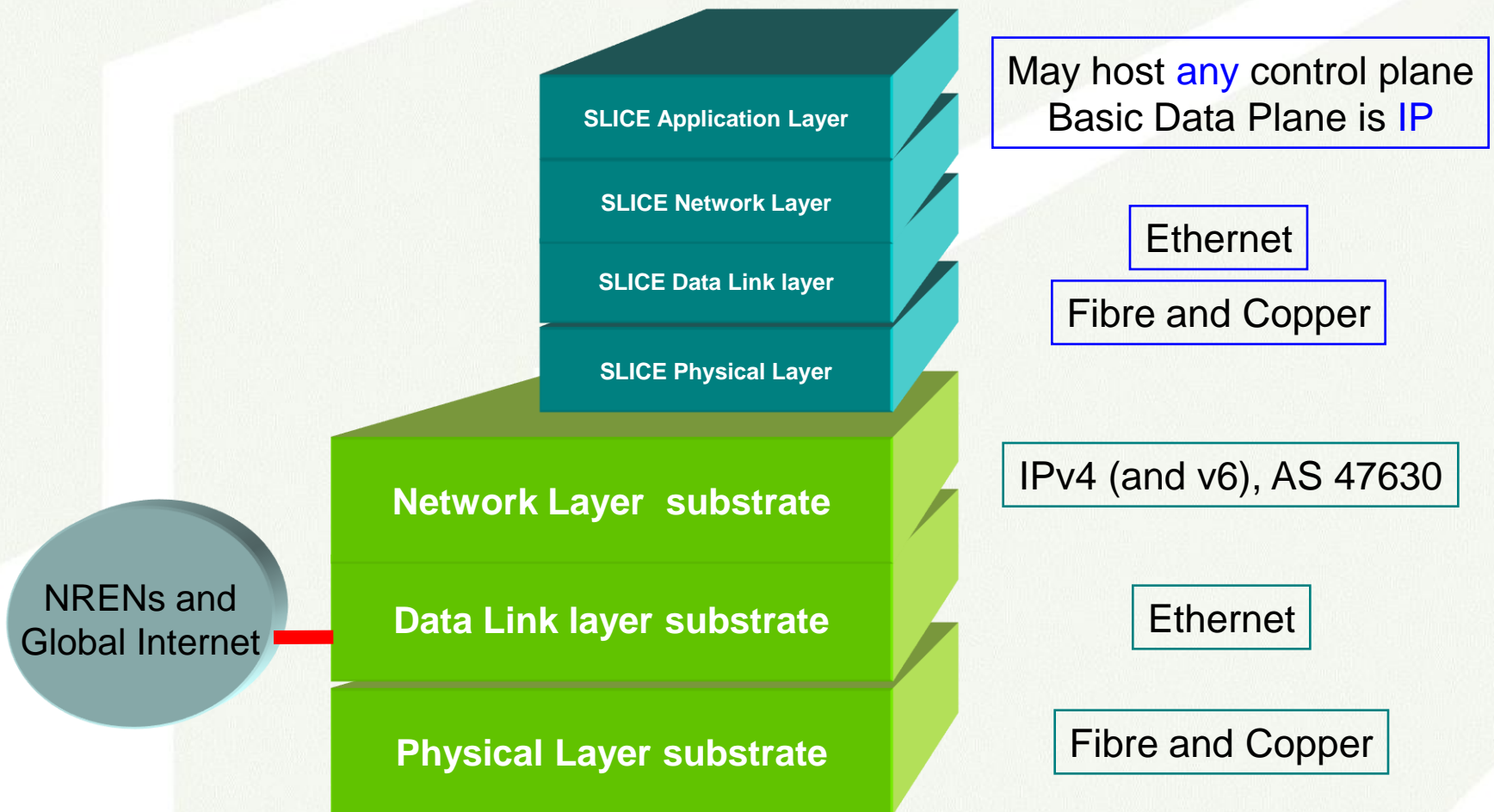
FEDERICA Data and Control Plane

Access protocol : initially paper due to need for scheduling, security and technical agreements (no first come, first serve policy). Next step may be based on SOA (need standard representation of resources)

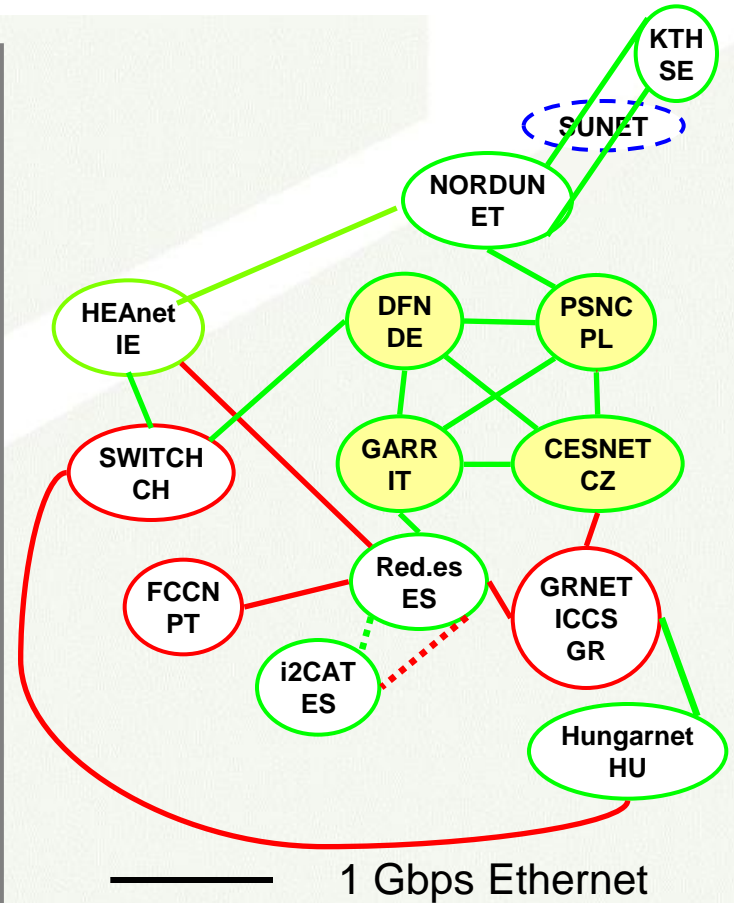
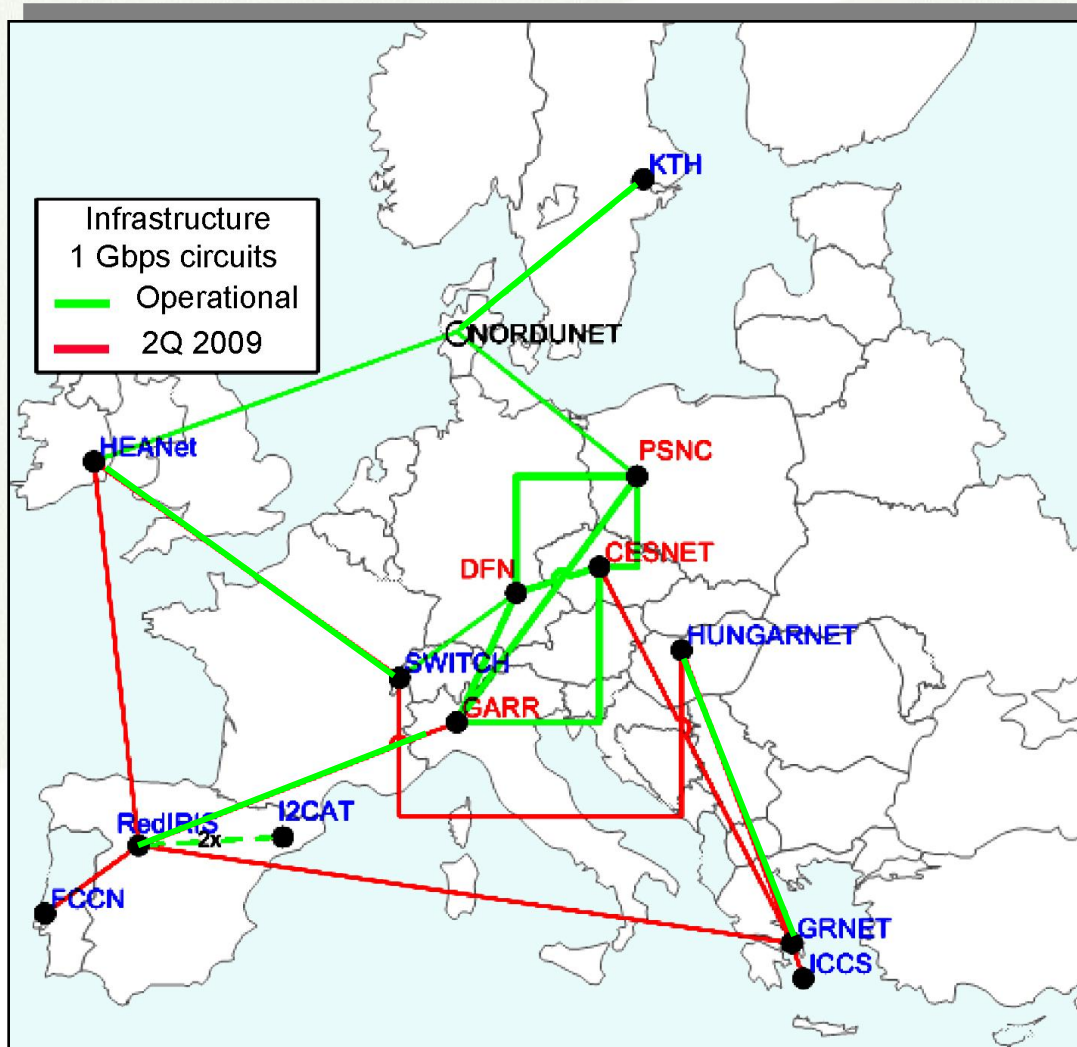
Control plane is not fully automated and it is a set of tools and manual configuration (due to the combined network and system resources)



Slice Data and Control Plane



FEDERICA Infrastructure Status



Each core PoP is equipped with a switch/router (Juniper) and two or more V-Nodes

We have the current users / projects active/in approval phase:

- Monitoring and Routing tests (ELTE / Onelab2)
- Enhanced GMPLS scalability (PHOSPHORUS project)
- Optical IP router - Facilities interoperability (Univ.Dublin)
- Openflow tests (Stanford, Germany, Sweden, Italy)
- FEDERICA monitoring (CESNET - Internal)
- Virtualization Performance (KTH, Sweden)

Automatically international collaborations