FEDERICA
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CAPACITIES

Consortium GARR

FEDERICA update

and some thoughts on e-Infrastructures

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FEDERICA at a glance

What: European Community co-funded project in its 7th Framework Program in the area “Capacities - Research Infrastructures”

3.7 MEuro EC contribution, 5.2 ME budget, 461 Man Months

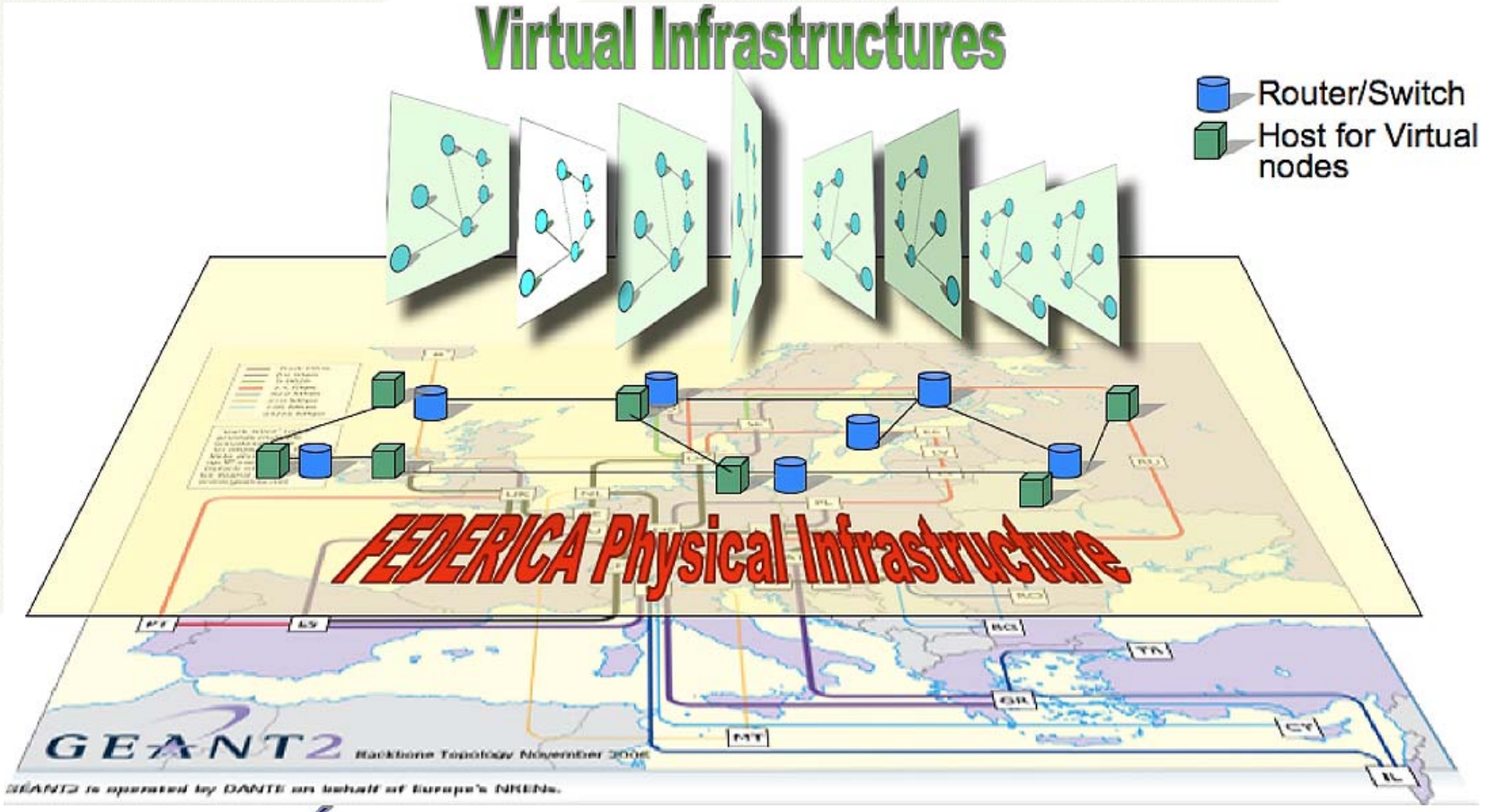
When: 1st January 2008 - 30 June 2010 (30 months)

Who: 20 partners, based on stakeholders on network research and management:

11 National Research and Education Networks, DANTE (GÉANT2), TERENA, 4 Universities, Juniper Networks, 1 small enterprise (MARTEL), 1 research centre (i2CAT) - Coordinator: GARR (Italian NREN)

Where: Europe-wide e-Infrastructure, open to external connections

An e-Infrastructure over an e-Infrastructure



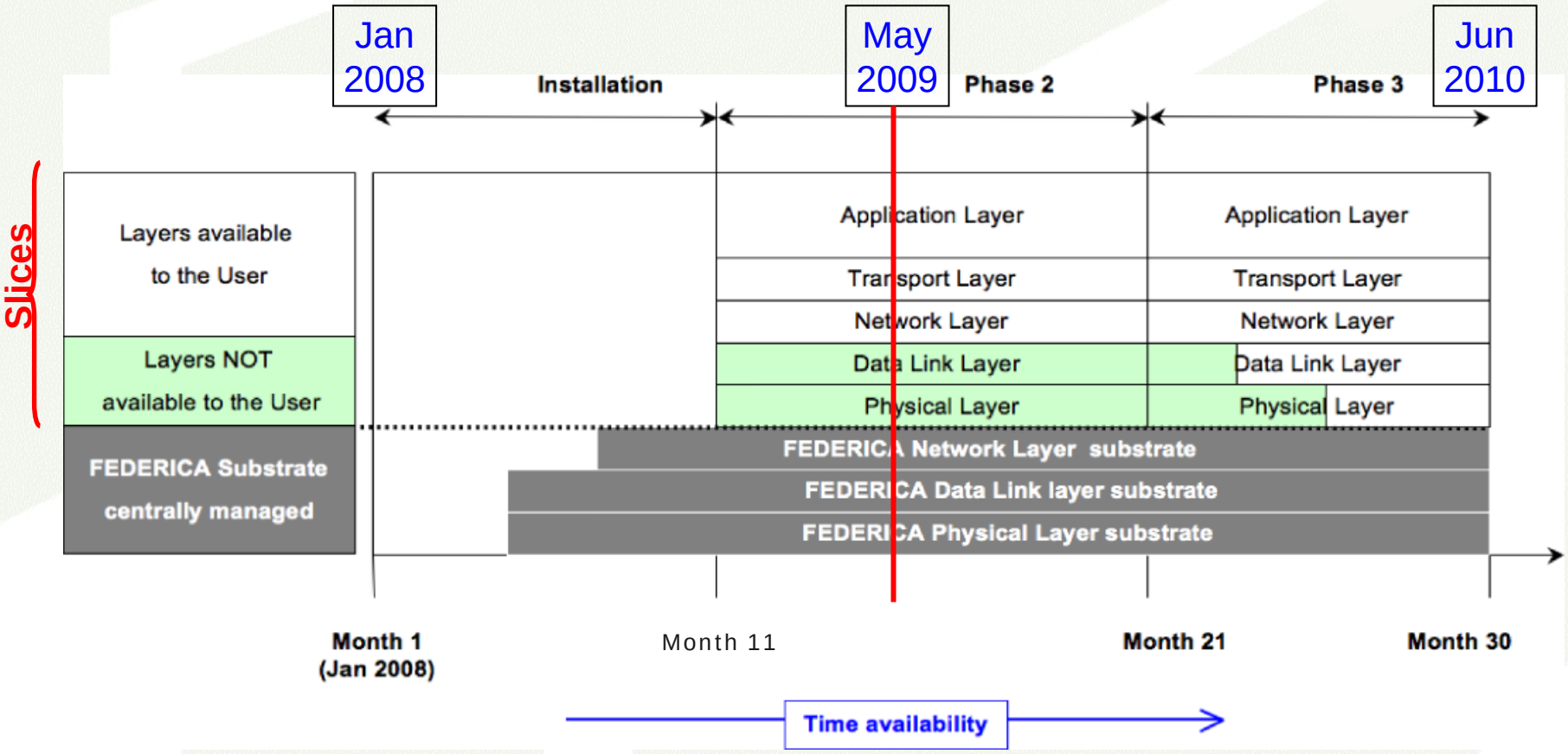
FEDERICA Infrastructure and its Offer

The infrastructure is planned for :

- Almost clean slate
- full control of virtual resources by the user
- control of lower network layers in realistic conditions
- achieving reproducibility of tests
- fast provisioning and chance of topology
- Access from everywhere in Internet to slices
- May host user's equipment
- Free-of-charge use of standard offer
- Access request moderated by a user policy board
- Simultaneous use by researchers' groups

Project Timeline

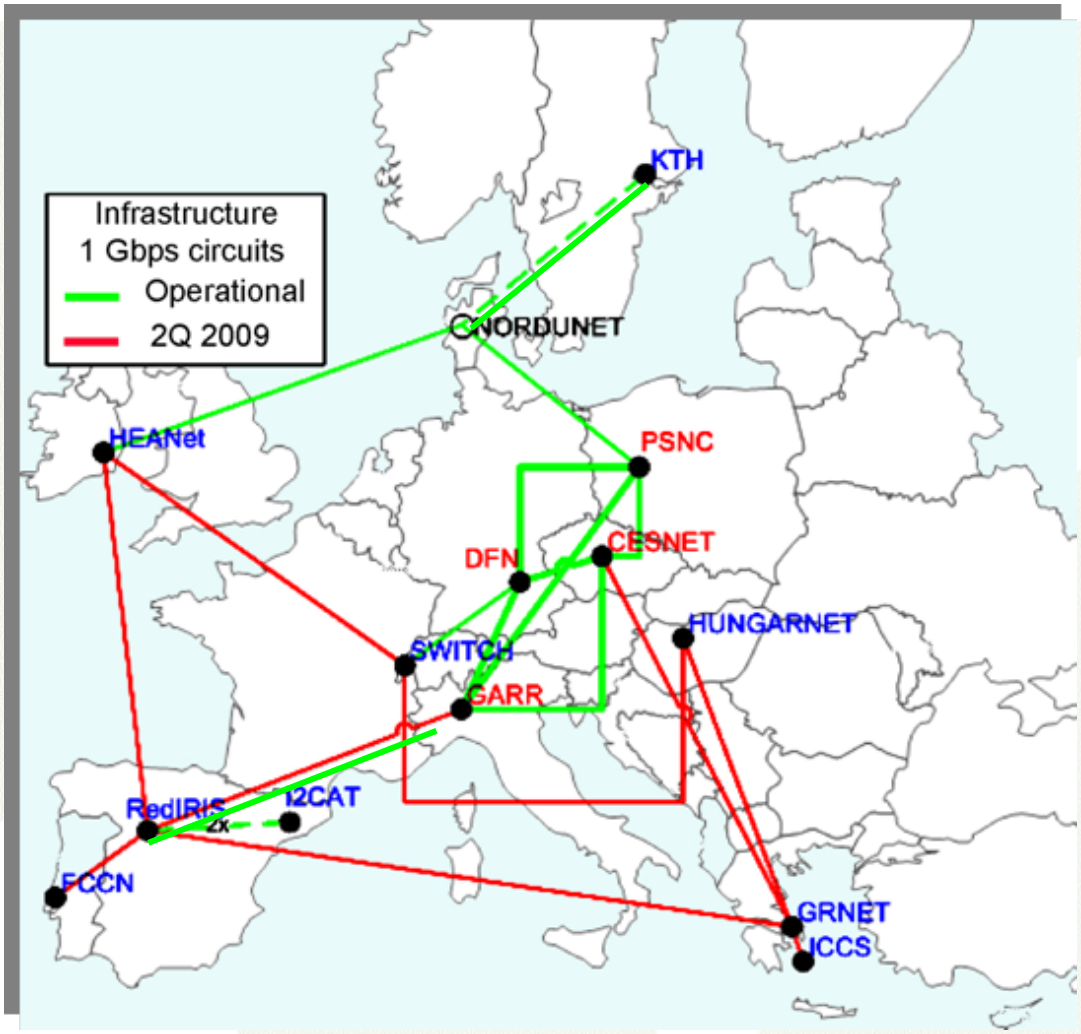
… proceeding according to schedule.

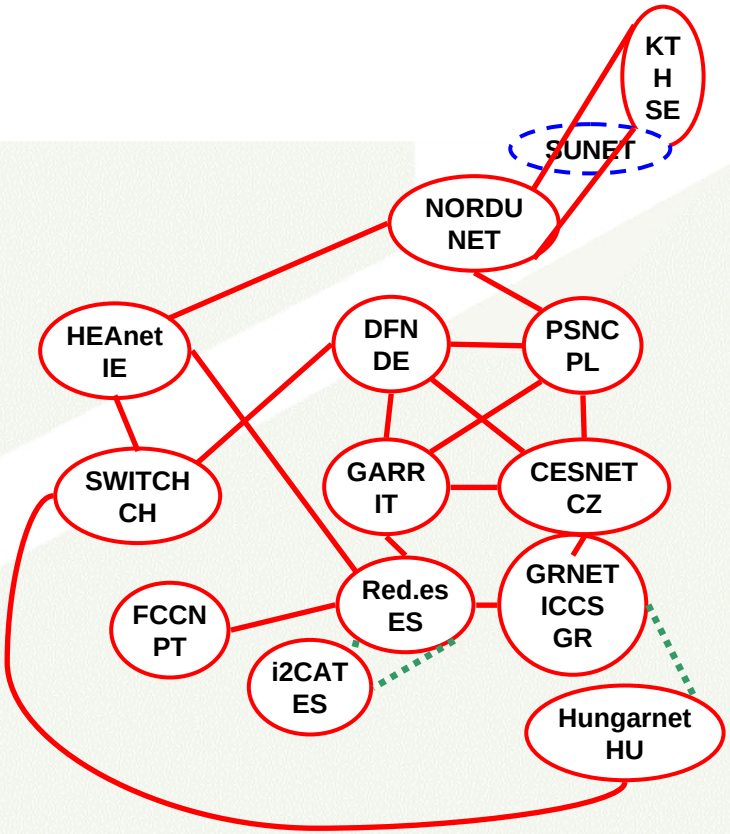


FEDERICA Objective Status and fulfillment

- The core e-Infrastructure is ready since Nov 2008 and it is being extended gradually to other PoPs. Timeline is according schedule.
- Extensive dissemination in 2008, first users on board, internal projects ongoing, joint work with IPsphere on standardization. Officially one of the FIRE facilities
- Research ongoing tightly coupled with the need to engineer and maintain an infrastructure. Virtualization framework defined and comparison with other efforts ongoing. Prototypes for management under development

Infrastructure Status



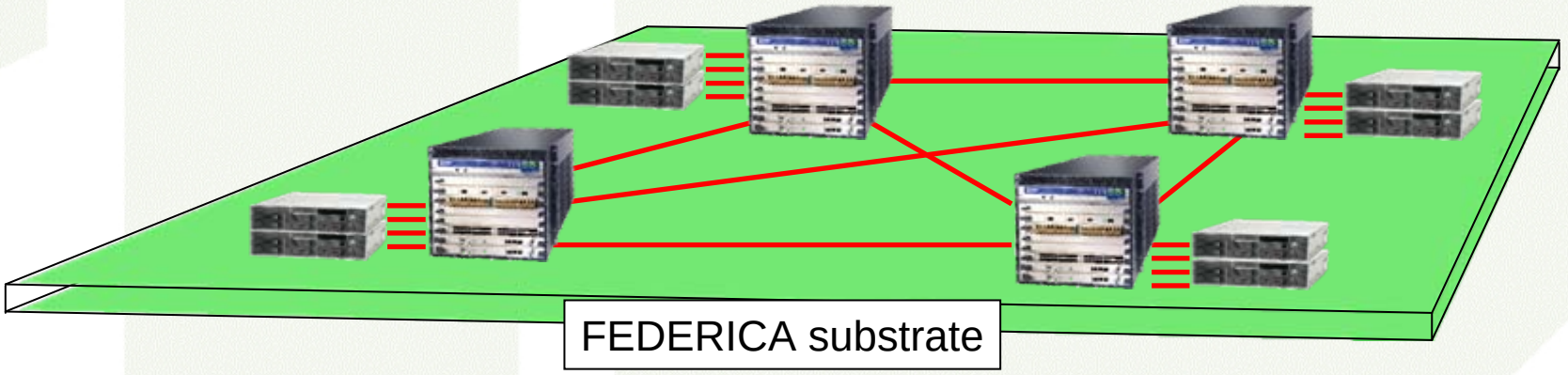


Each new PoP is equipped with a smaller switch/router (Juniper EX family) and one (or two) V-Nodes

The Core Substrate - HW

Switch: Juniper MX480, Dual CPU, 1 line card with 32 ports at 1Gb Ethernet. Virtual and logical routing, MPLS, VLANs, IPv4, IPv6, 2 of the 4 line cards have hardware QoS capabilities)

V-Nodes: each is a 2 x Quad core AMD @ 2GHz, 32GB RAM, 8 network interfaces, 2x500GB disks, Virtualization SW



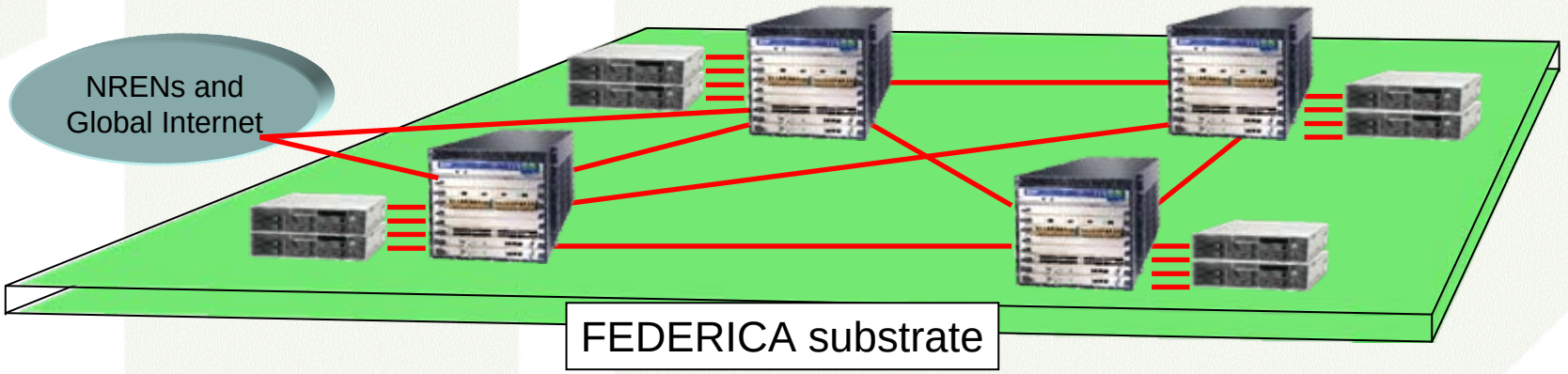
The Core Substrate - IP

Management plane defined as an IP Autonomous System:

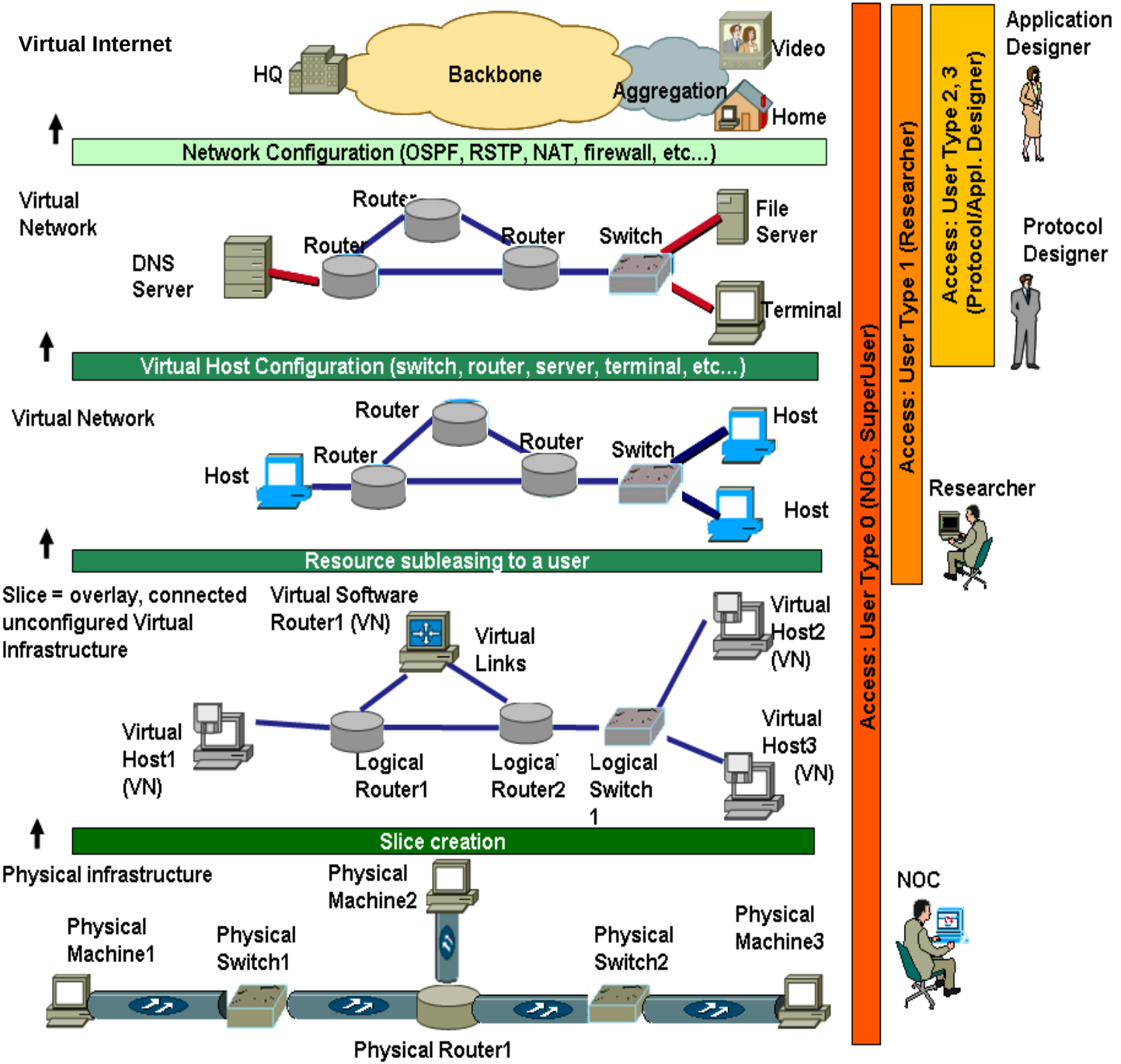
AS : 47630 (public, no transit, peers with GARR, PSNC which announce the AS to GN2 and General Internet) active

IP v4 : 194.132.52.0/23 (public addresses) active

IP v6 : 2001:760:3801::/48 (public) (to be configured soon)



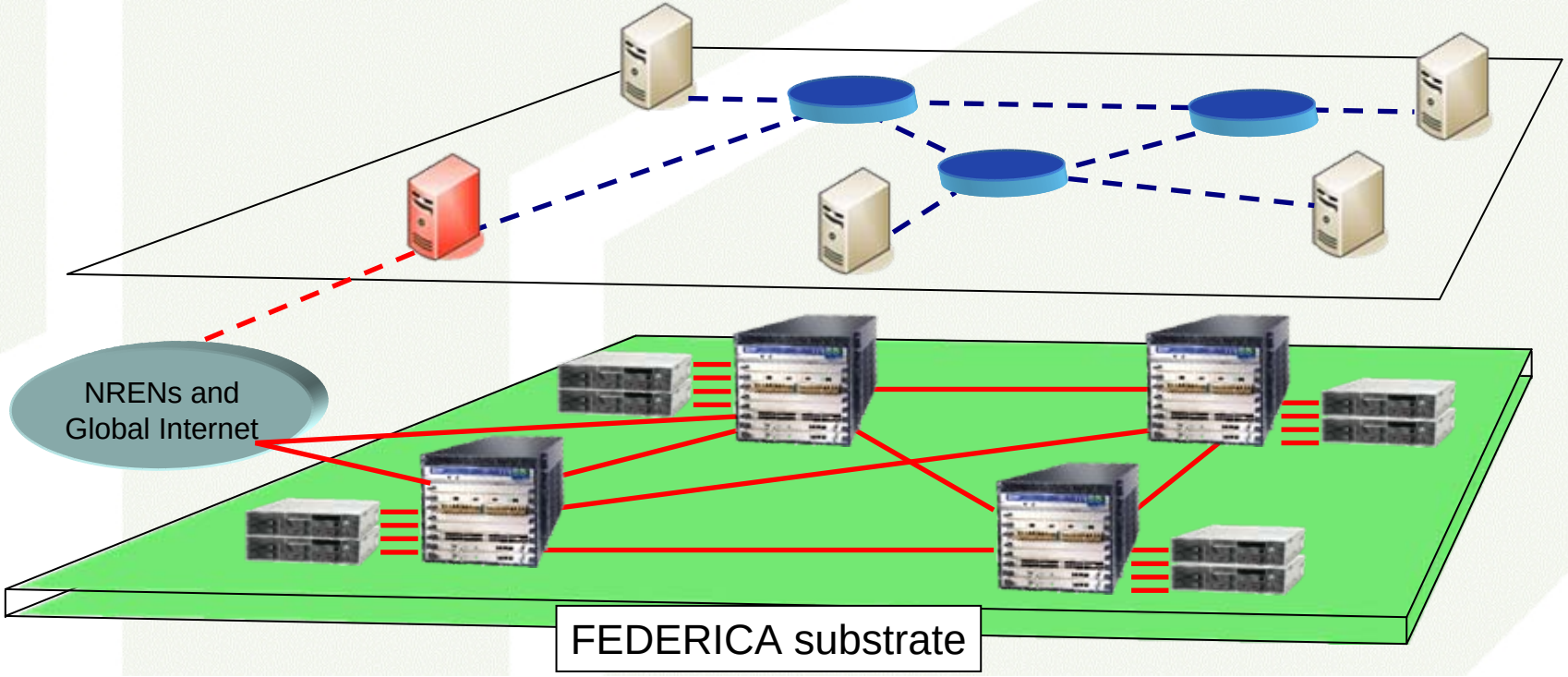
From physical to virtual



Pictorial of creation of a Slice

The user requests an Infrastructure made of L2 circuits, un-configured virtual nodes, to test a new BGP version. Creation of:

1. user credentials and authentication, create entity “Slice”
2. Virtual Gateway (in red) to bridge the user from outside into the slice
3. Create resources and connect them as specified by the user



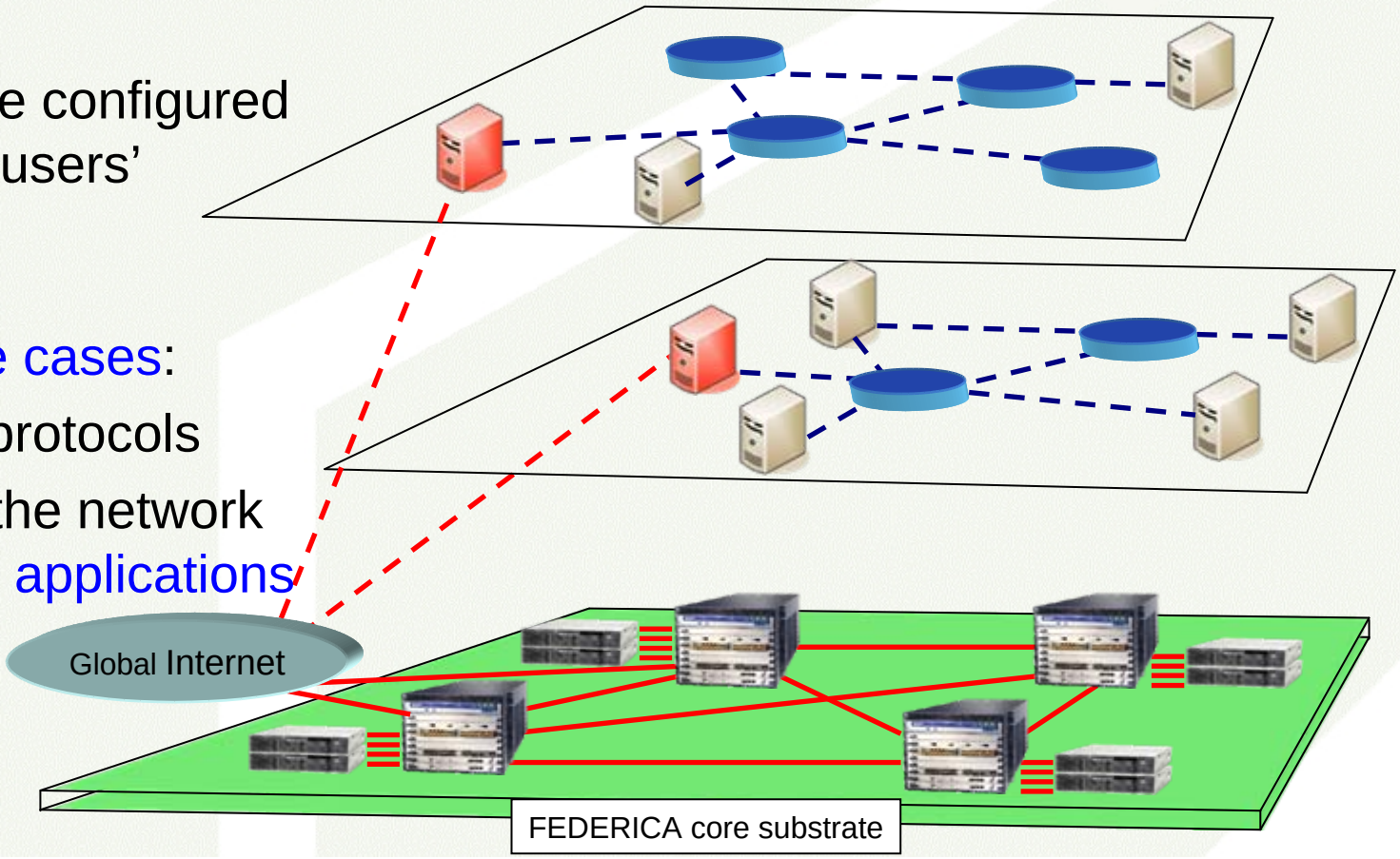
Offering “Slices” for “any” Research

Using Virtualization technologies the FEDERICA e-Infrastructure creates “slices” composed by virtual resources (circuits, nodes, routers)

The slices are configured according to users’ requests

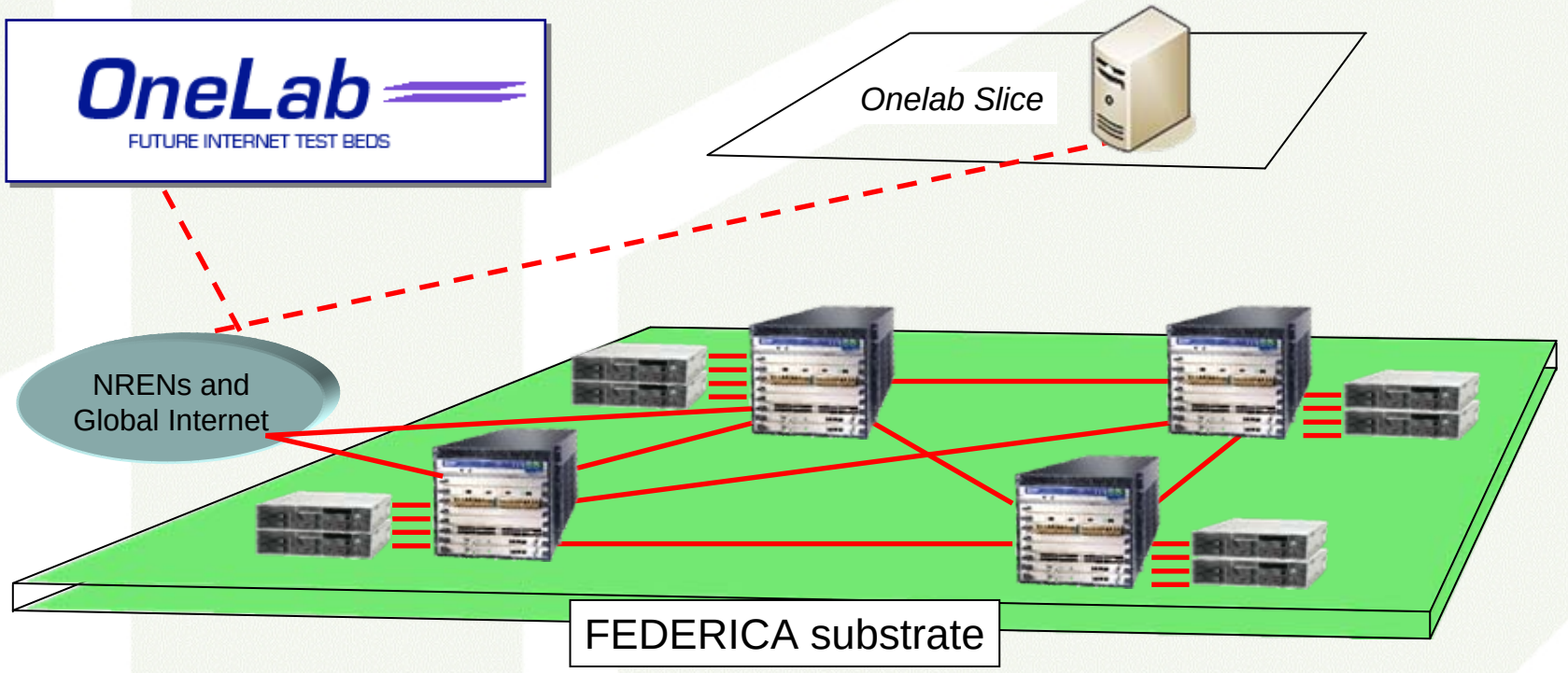
Possible use cases:

- new routing protocols
- behavior on the network of distributed applications
- Inter-domain services



FEDERICA - Onelab pre-federation

OneLab nodes can be hosted in a slice. Those node have full control of their network interface and circuits up to the egress from FEDERICA into General Internet. The slice can contain also a “OneLab router”



Federating FEDERICA

- Data plane is IP based (packet switched Ethernet)
- Physical connectivity can be accepted, currently with wired Ethernet
- Access is regulated by humans for first access, automated protocols (control) can be used later (trust and AAI needed)
- Not yet resources representation schemas available (needed to describe the available services)
- Inter-facility control plane not yet available (complex see GENI research)
- Intra-facility control plane is complex, due to scheduling and slice mapping to physical topology tasks, now manual

Users

The project had its launch event end of November 2008.

We have the current users / projects ongoing approved:

- Onelab and monitoring testing (Hungary)
- Openflow tests (Stanford, Germany, Italy)
- Monitoring (Czech Rep. - Internal)

Pending requests from Ireland, Italy, Spain, Germany

Many requests for interconnection capabilities between initiatives and laboratories and some requests for optical testing

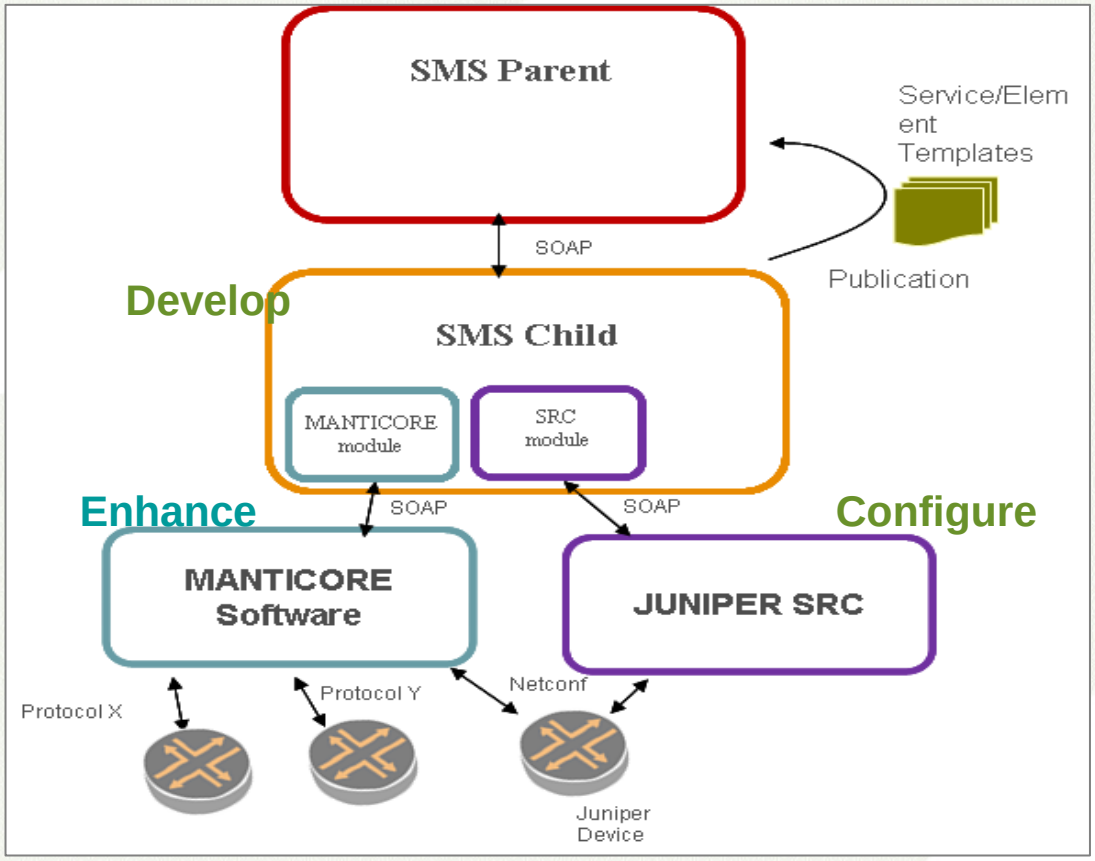
Contributionn to standards

IPsphere-FEDERICA interoperability prototype:

SMS Child design and implementation (Phase I) using Juniper SRC and MANTICORE

Use Case:

IPsphere Framework can configure the resources in a FEDERICA slice managed by MANTICORE and resources owned by an NREN or a Commercial ISP as part of the same end-to-end service.

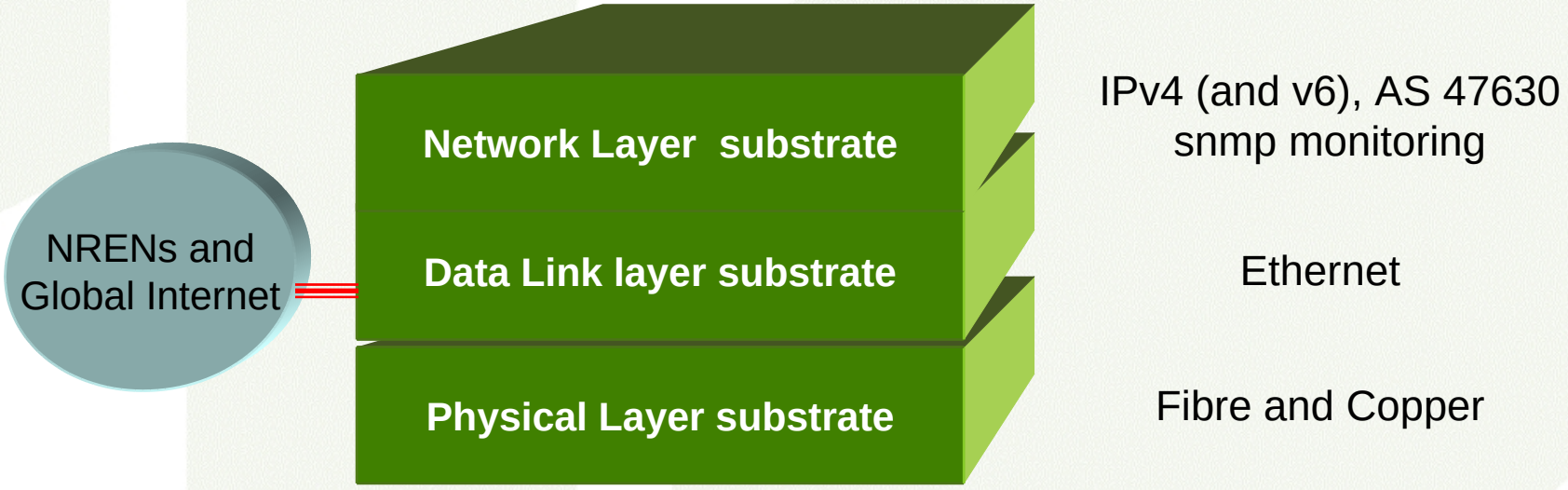


FEDERICA Partners

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