E-Science services evolution at RedIRIS

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OutLine

- Introduction. Where is RedIRIS?
- Network evolution.
- RedIRIS pilot transfer service based on Aspera
- Science DMZ pilot.
- Mastema performance service.

What is RedIRIS?

RedIRIS is the Spanish academic and research network that provides advanced communication services to the scientific community and national universities. It deploys various links of up to 10,000 MB which are used for science projects, making the work of researchers easier.

It is a data network which supports scientific development

It is a testbed for new technology and services

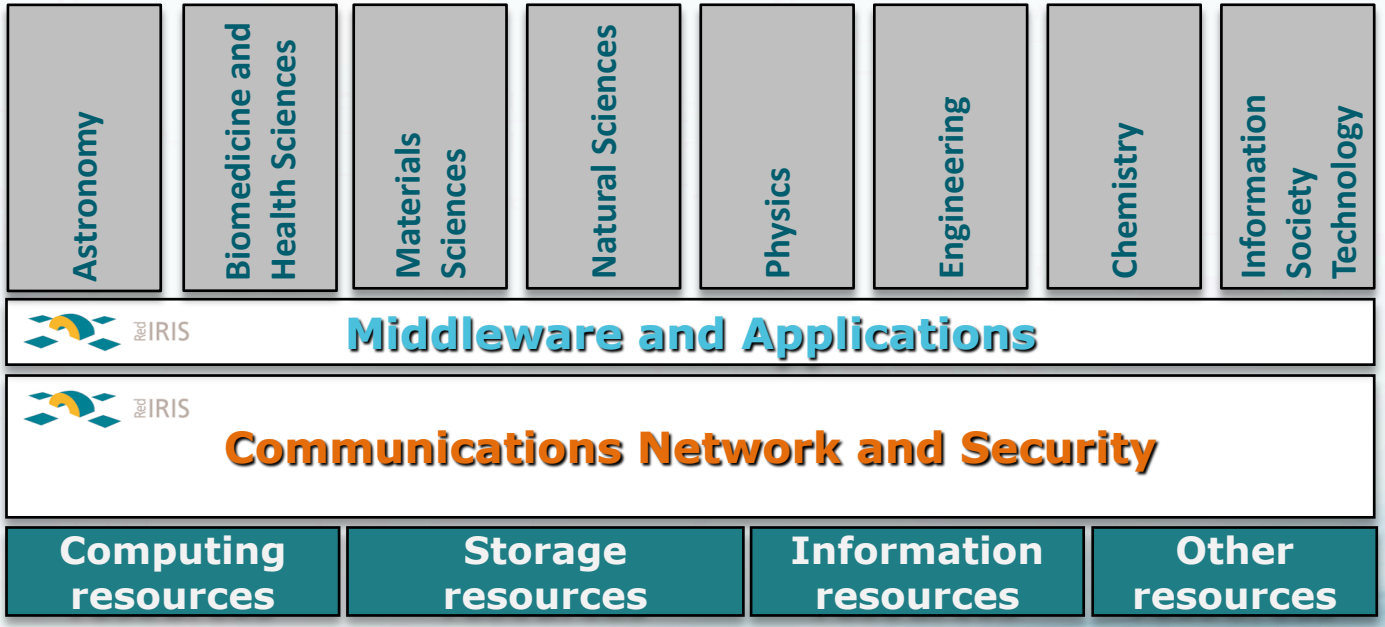
RedIRIS

It is a collaborative tool for scientists

It helps to foster Information Society

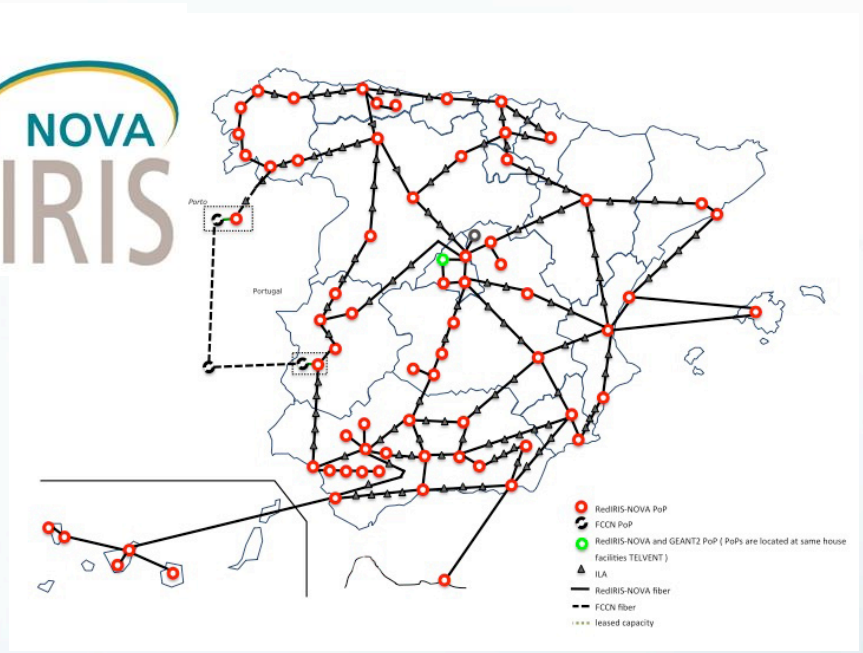
RedIRIS and e-Science

e-Science is the scientific activity that intensively uses new technologies. In this environment common horizontal e-infrastructures play a prominent role. This includes advanced communications networks for universities and research centres, such as RedIRIS



Network evolution (I)

A key tool for enabling remote collaboration among researchers and teachers, regardless of their geographic location.



Project definition

Initiates first tenders

Implementation of the **First Phase**

Network operational **Second Phase**

2006 2007 2008 2009 2010 2011 2012 **2013** 2015 **2033** **2042**

MICINN approval

Ministers Council approval

Deployment completed

Iberian Peninsula IRU completed

Canary Island IRU completed

Network evolution (II)

Institut de Radioastronomie millimetrique (Granada)

Doñana Biological Station

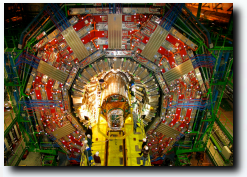
IAC Great Telescope of the Canary Islands

Extension of the dark fibre network to **Research and Large-scale e-Science** centers.

Calar Alto Observatory (Almeria)

Telescope of the Yebes Astronomical Centre (Guadalajara)

CSIC National Microelectronics Centre



CERN (Switzerland)

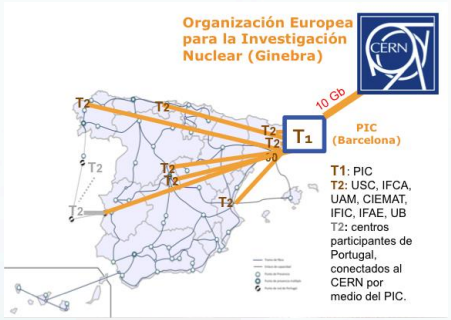
Marenostrum, Barcelona Supercomputing Centre (Barcelona)

Laboratory of the Polytechnic University of Madrid

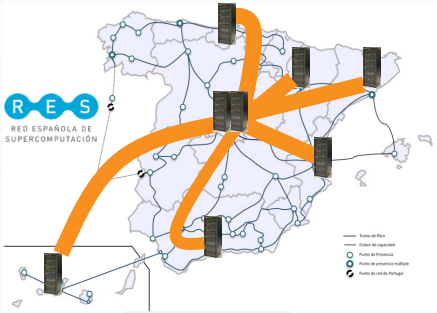
Network evolution (III)

Upgrade to 100G.

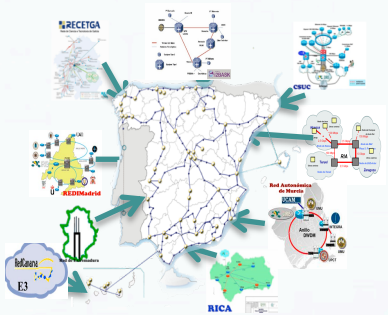
RedIRIS is working on a administrative procedure that allows the refresh of the optical network equipments.



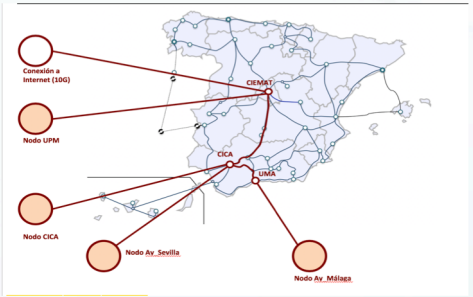
LHC



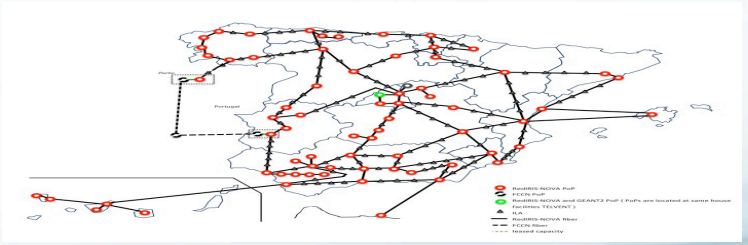
RES



IP Network



FIWAT/Fiware



RedIRIS pilot transfer service based on Aspera (I)

- OpenSource improved transfer protocols (like UDT or Tsunami) currently have some issues.
  - Poor adaption to network condition where latency and lost packets are high
  - User interfaces are not friendly
  - Developemnts are not duly updated and manteined.
  - Support problems with firewalls
- Aspera offers a commercial solution, based on those some protocols, that tries to overcome the existing issues.
  - FASP transfer technology is Aspera patented.
  - It eliminates the current issues of the TCP based transfer protocols.

RedIRIS pilot transfer service based on Aspera (II)

RedIRIS used funding to buy an Aspera license.

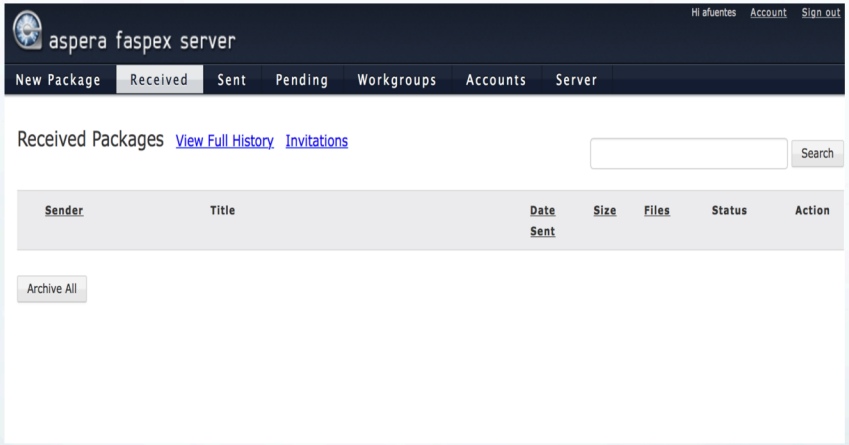
- Up to 2,5Gbps. 10 Gbps will be available in January 2019.
- Centralized architecture to avoid the need for licenses in both ends of the tranfer.
- Currently 0,7 PB for temporary storage of files.
- Integration with SAML and RedIRIS Federation identity.

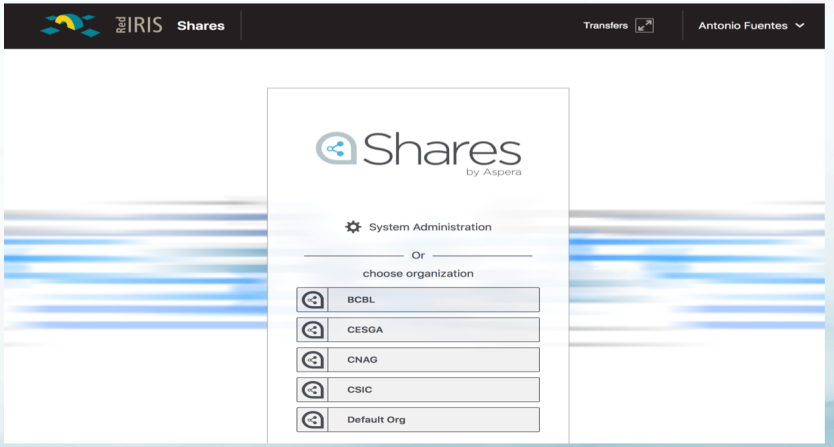
Fasp protocol implemention.

ScaleIO Storage Platform

RedIRIS pilot transfer service based on Aspera (III)

- Many ways for using the plafform:
  - Aspera Share.
  - Aspera Faspex
  - Common Line Interfaces
  - APIs



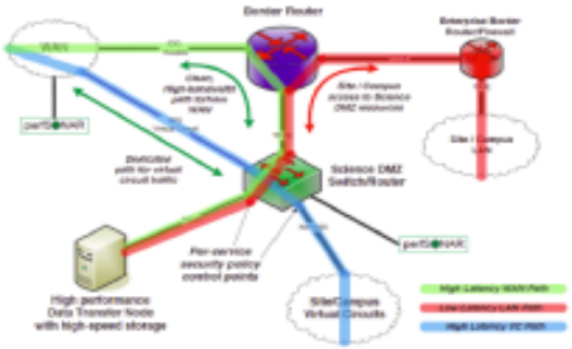


Science DMZ pilot

- Science DMZ is a another approaches to solve the TCP performance issue.
- RedIRIS is starting to work in a pilot.
- Implemented in US (ESNET, several research centers and campuses).
- Trial in Europe (SUFTnet). https://www.surf.nl/en/news/2017/01/index.html

What are 'Science DMZs' and why do we need them?

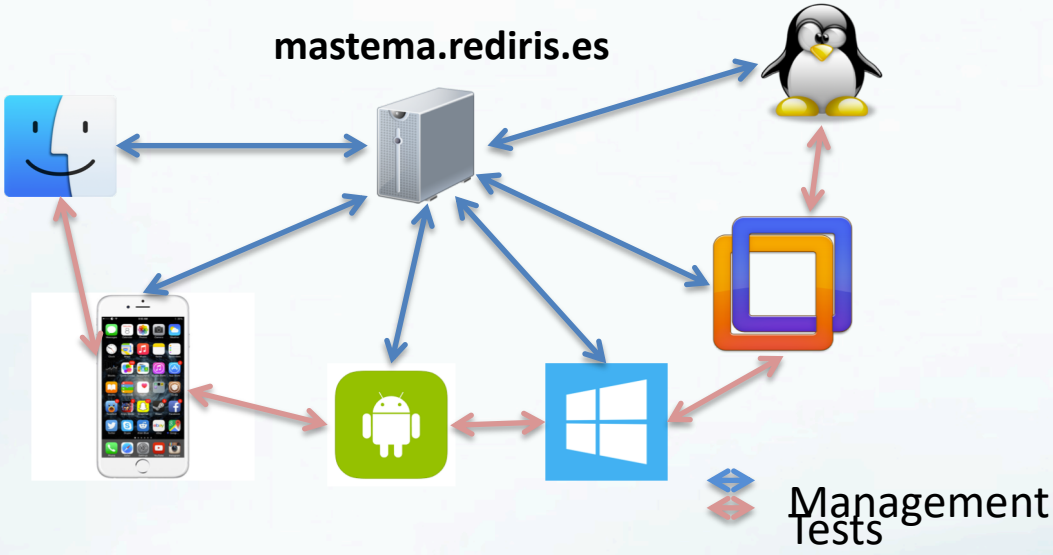
- The Science DMZ model addresses network performance problems seen at research institutions
- It creates an environment optimized for data-intensive scientific applications such as high volume bulk data transfer or remote control of experiments
- Most networks designed to support general-purpose business operations and are not capable of supporting the data movement requirements of data-intensive science applications



Thanks to Eli Dart, LBNL

Mastema performance service (I)

- The mastema service allows end users or institution to test or verify the quality or performance of their network Access.
- Based on a centralized servers
- More information: http://www.rediris.es/conectividad/rendimiento.html



Real Service Test

- HTTP
  - Avaliability and download time
- FTP
  - Download time
- DNS
  - Query
- TCP/UDP ping and Traceroute
- Bittorrent
- Dropbox
- Email
- Youtube
- IGMP
- From OVA or harware endpoints

Mastema performance service (II)

METRICS

- Throughput
  - As goodput in RFC 2647 – throughput associated with packet payload, ignoring headers
- Transaction rate – transactions per second
- Response time – seconds per transaction
- Lost data – only payload data is included in calculations
- Max Lost Burst
- Jitter
- Delay
- MOS – ITU G.107 Mean Opinion Score
- Media Delivery Index Calculation
- Packet Jitter – individual packets in a media stream
- Delay Factor & Media Loss Rate & Media Delivery Index

Node to node test

- UDP/TCP throughput
  - Bitrate
- KPIs
  - Loss/jitter/latency
- QoS level 3
- Voice and Video – using different codecs, simulating transmissions
- TCP Response time
- Transaction response time http/https, pop3/stmp, FTP, DNS, Exchange 365 and SIP

¡Muchas gracias!

Más de 25 años al servicio de la investigación