EU DataGrid - Network Monitoring

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DataGrid Network Monitoring

- Several tools in use – plugged into a coherent structure:
  - PingER, RIPE one way times, iperf, UDPmon, rTPL, GridFTP, and NWS prediction engine
- continuous tests for last few months to selected sites:
  - DL Man RL UCL CERN Lyon Bologna SARA NBI SLAC …
- The aims of monitoring for the Grid:
  - to inform Grid applications, via the middleware, of the current status of the network – input for resource broker and scheduling
  - to identify fault conditions in the operation of the Grid
  - to understand the instantaneous, day-to-day, and month-by-month behaviour of the network – provide advice on configuration etc.
- Network information published in LDAP schema – new self-defining
- Cost Function in development – collaboration with WP1 & WP2
- Will be used by UK GridPP and e-science sites and non HEP WPs
- Links to GGF and the US work PPDG, IvDGL, GriPhyn

Network Monitoring Architecture

WP7

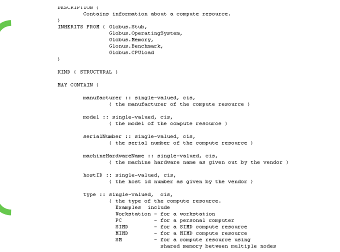
Grid Apps
GridFTP

PingER
(RIPE TTB)
iperf
UDPmon
rTPL
NWS
etc

Local Network Monitoring Store & Analysis of Data (Access)

Backend LDAP script to fetch metrics
Monitor process to push metrics

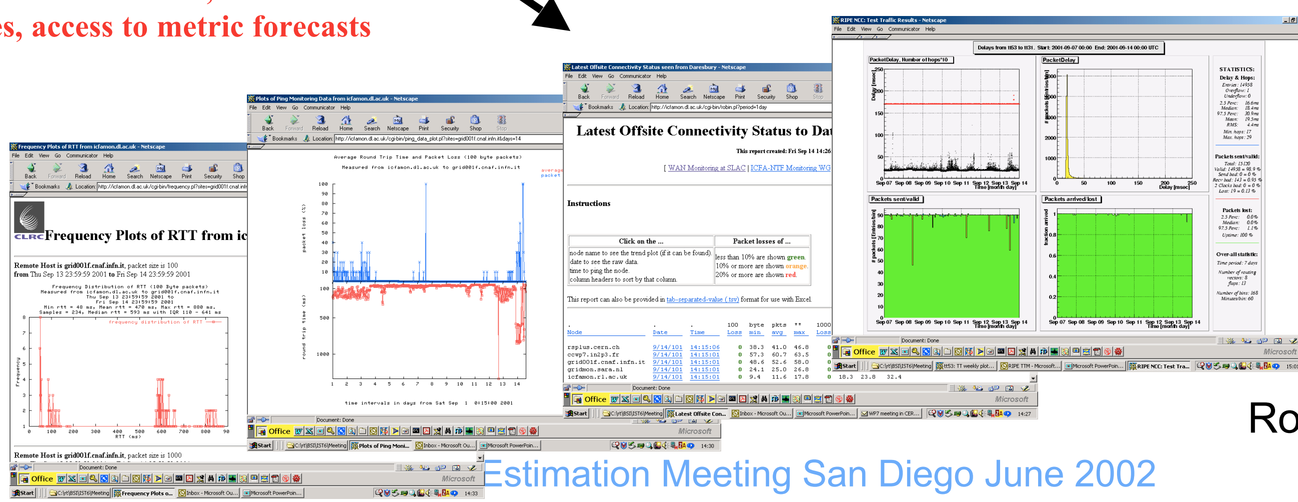
LDAP Schema



local LDAP Server

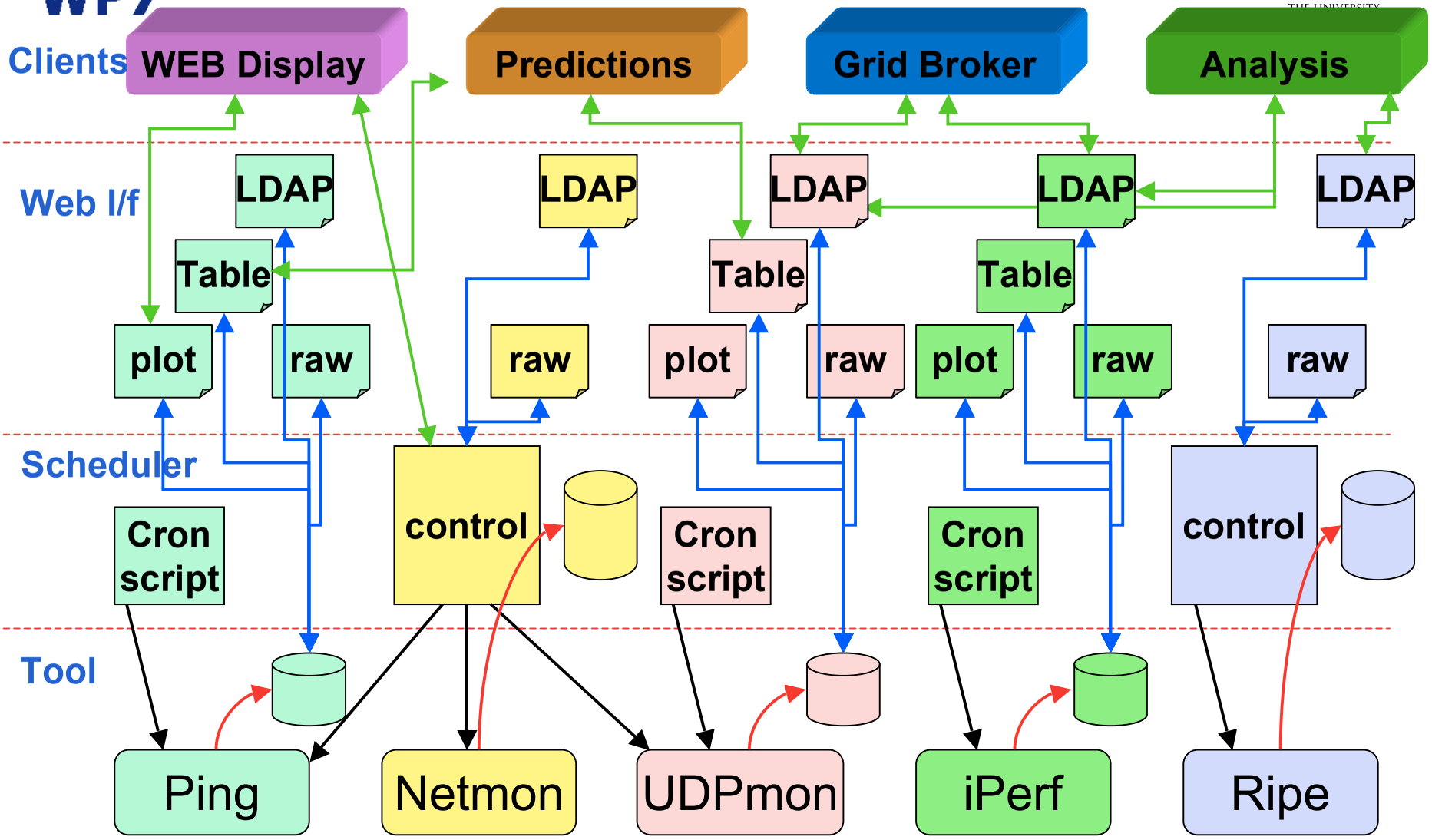
Grid Application access via LDAP Schema to
- monitoring metrics;
- location of monitoring data.

Access to current and historic data and metrics via the Web, i.e. WP7 NM Pages, access to metric forecasts

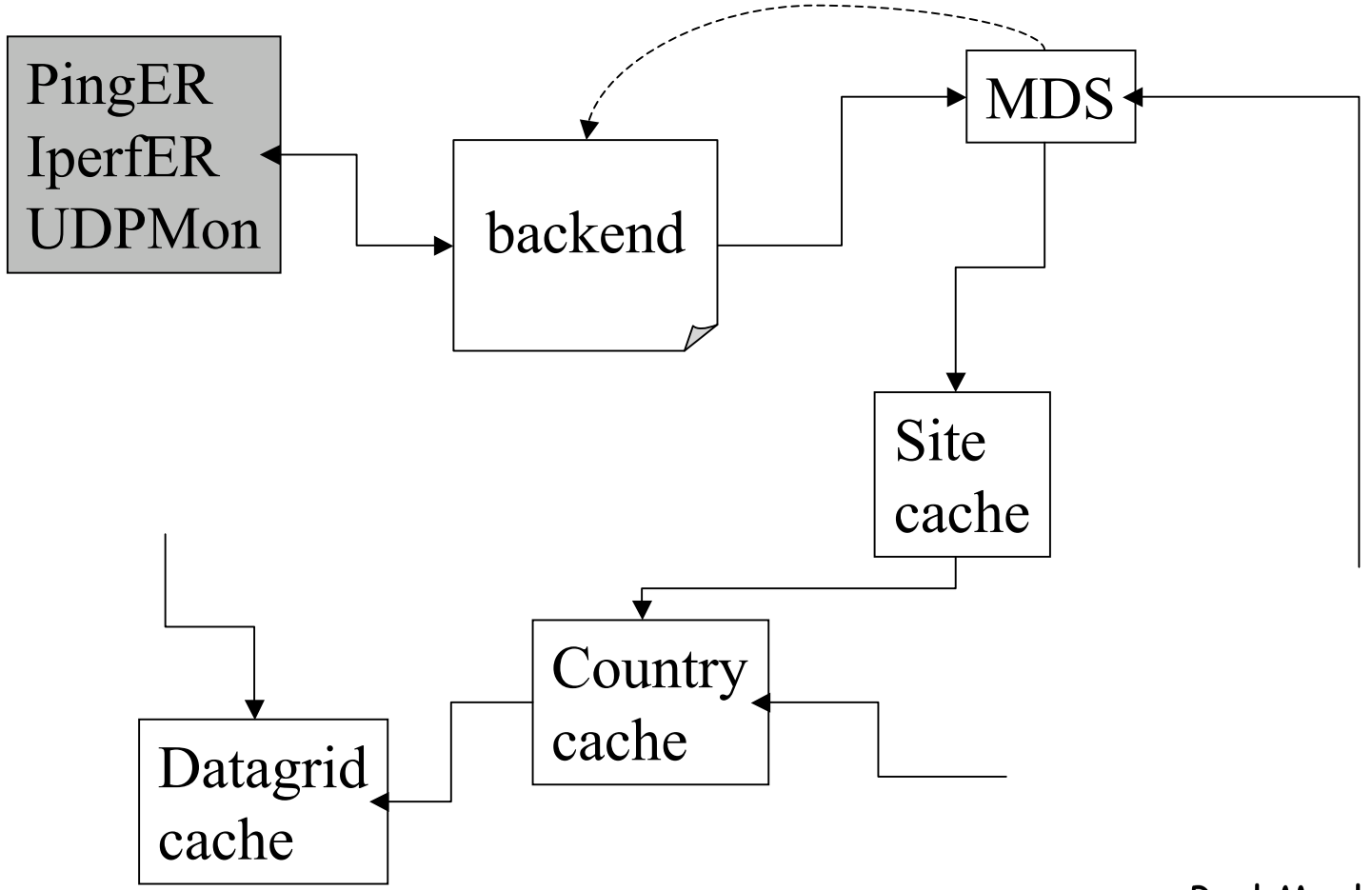


Robin Tasker

Network Monitoring Components

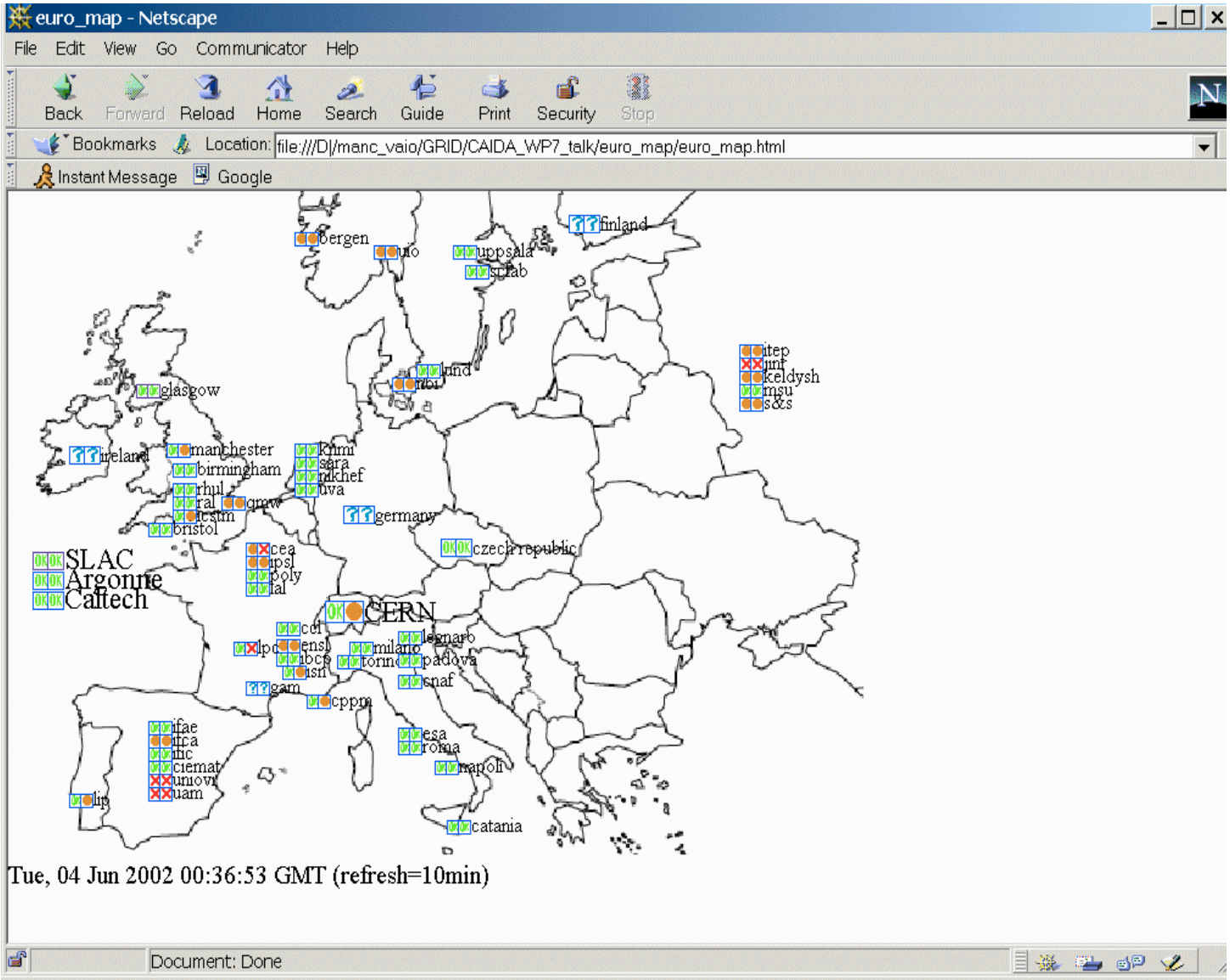


How Grid Accesses / Uses the Data

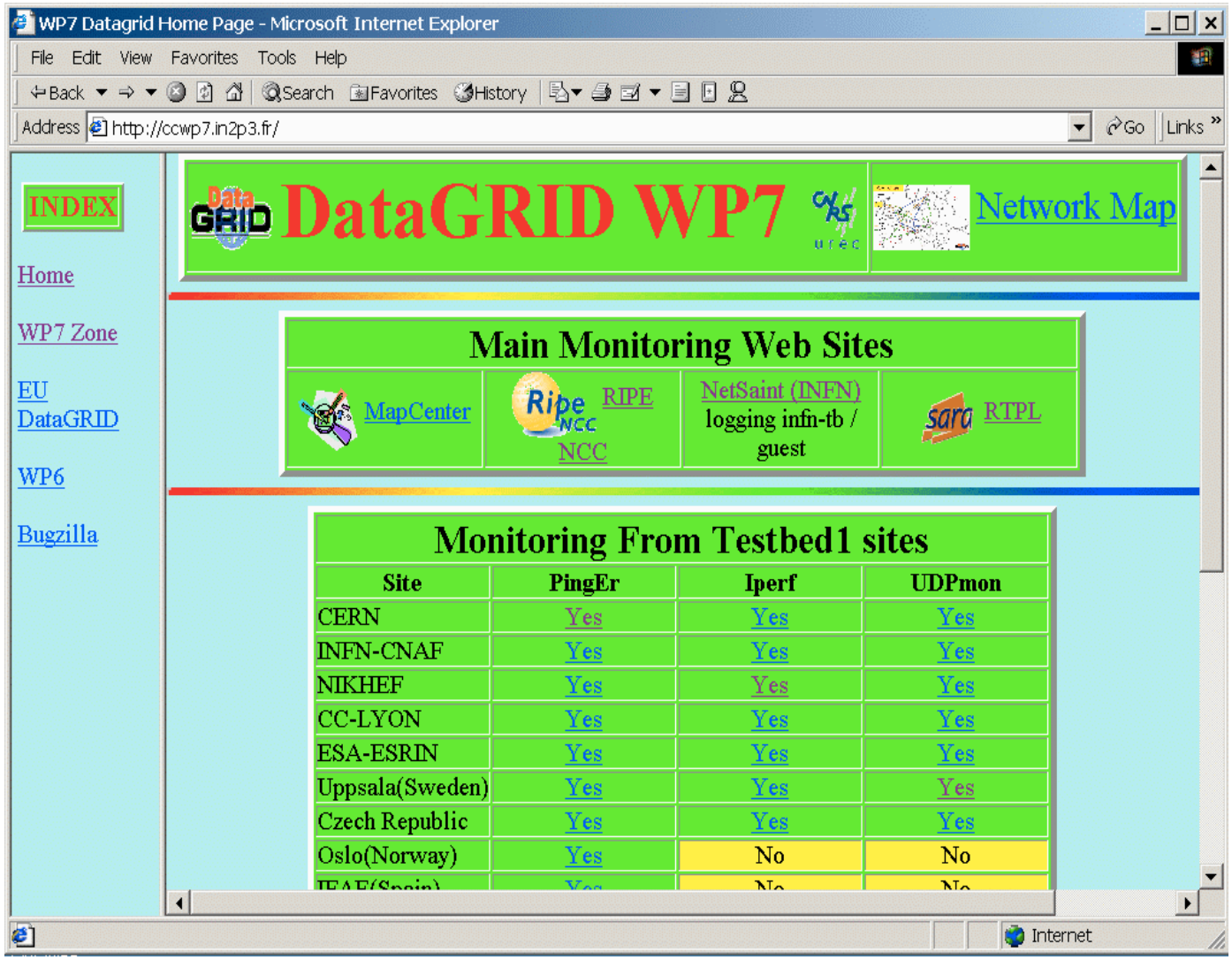


Paul Mealor UCL

Network Monitoring – Summary Map



Network Monitoring - MapCentre



Network Monitoring: Ping

WP7

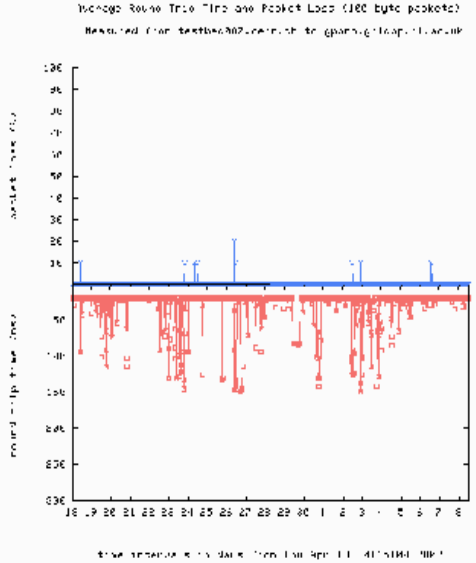
CERN to RAL

Plots of Ping Monitoring Data from testbed007.cern.ch Page 1 of 2

Plots of Ping Monitoring Data from testbed007.cern.ch

Remote Host is gppmm.gridpp.rl.ac.uk
packet size is 100
from Thu Apr 18 0:15:00 2002 **to** Wed May 8 12:15:00 2002
There is a time interval every day

View rtt frequency plot of this data here

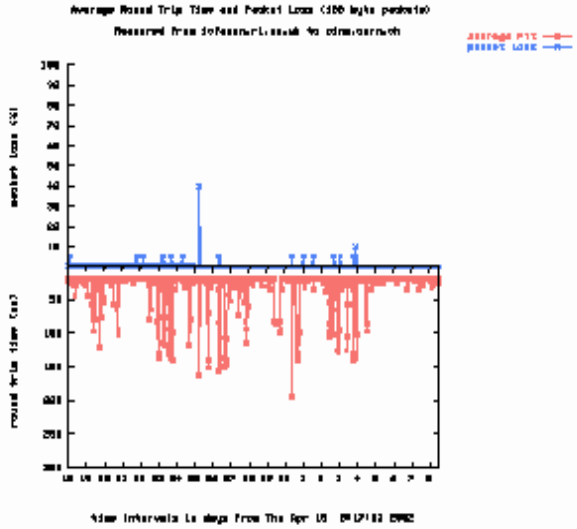


PPNCG: RAL to CERN

Plots of Ping Monitoring Data from icfamon.rl.ac.uk

Remote Host is ping.cern.ch
packet size is 100
from Thu Apr 18 0:17:33 2002 **to** Wed May 8 11:17:30 2002
There is a time interval every day

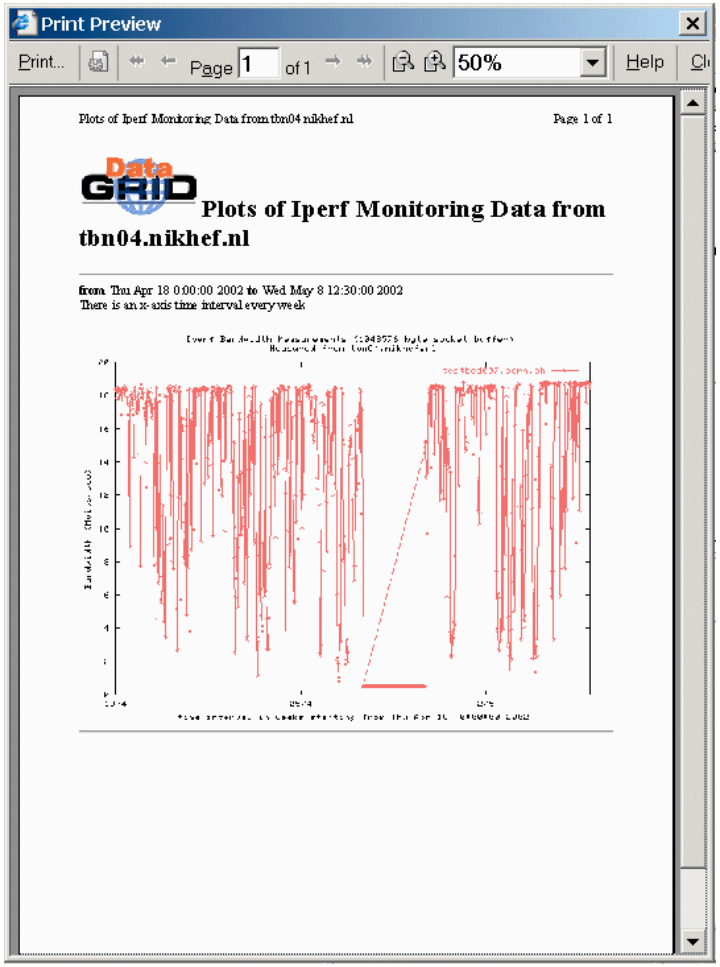
View rtt frequency plot of this data here



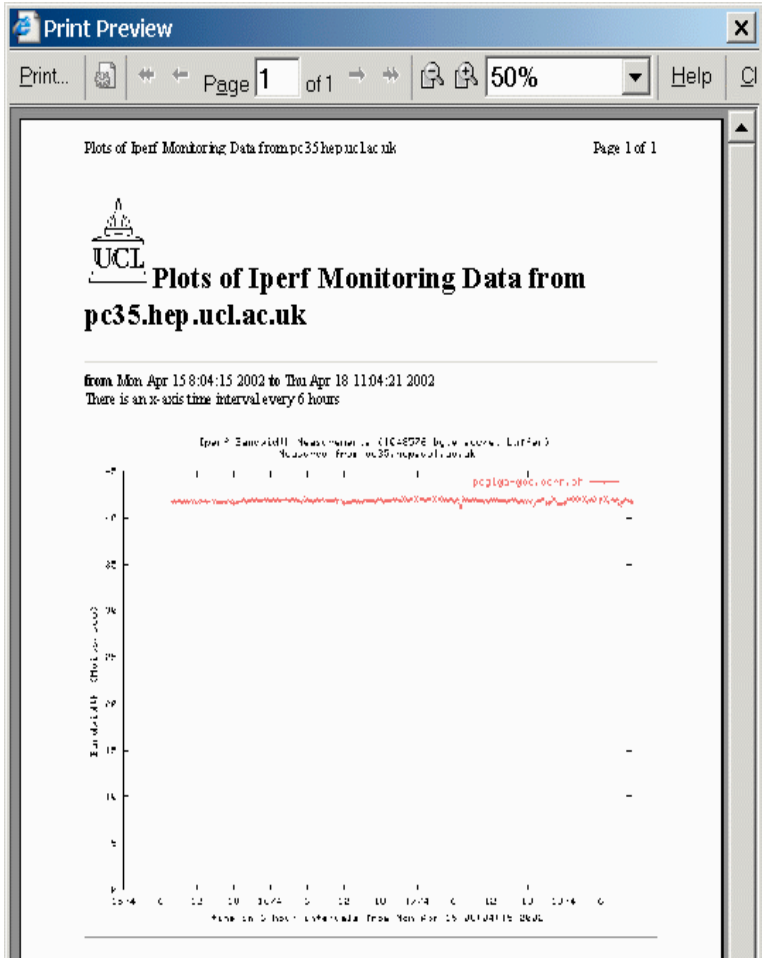
Network Monitoring: Iperf (TCP)

WP7

NIKHEF to RAL



UCL to CERN

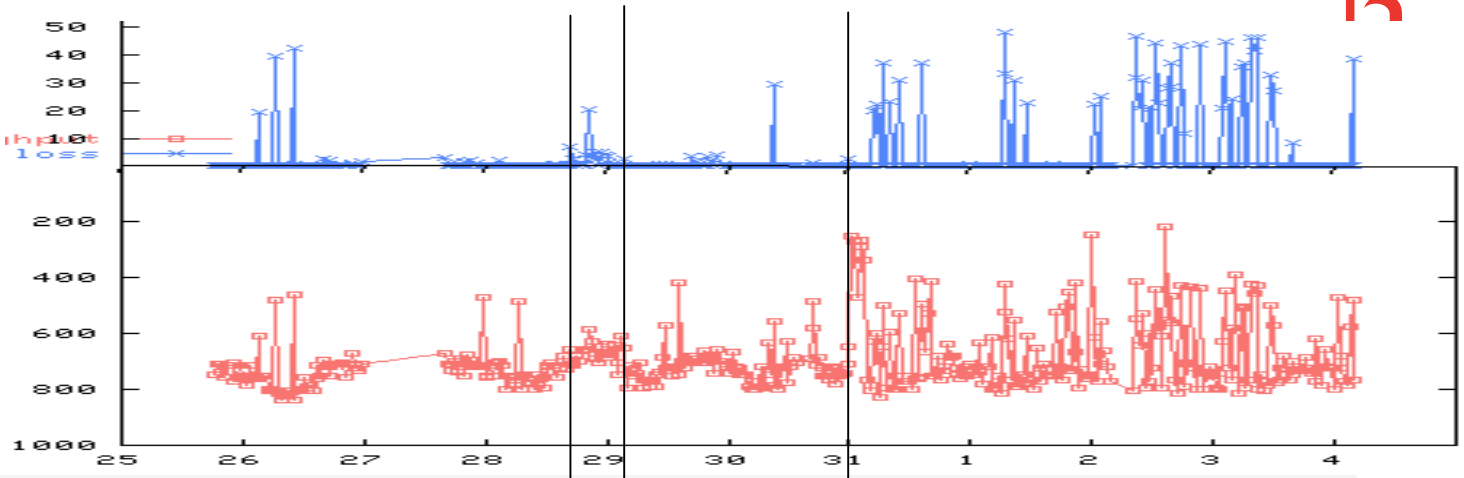


UDPmon & Ripe MAN-SARA from 25 May 02

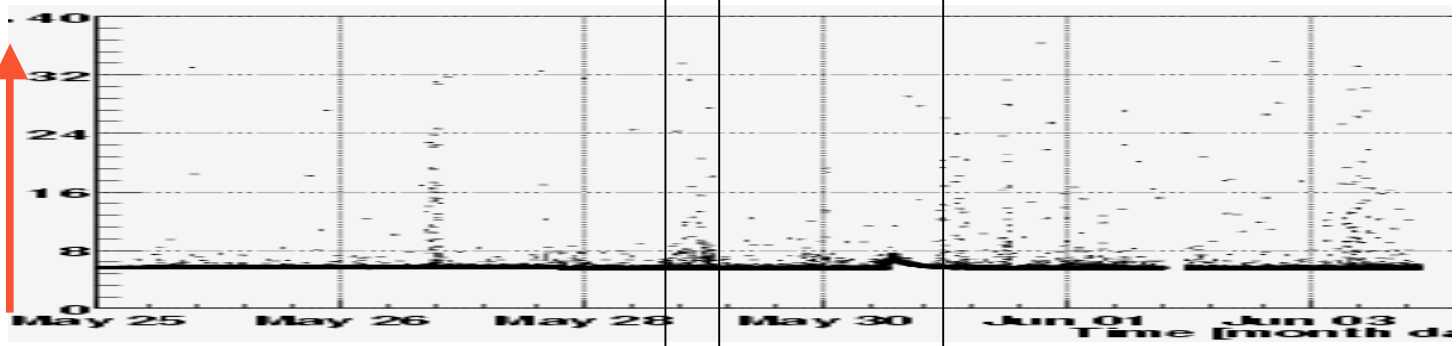
WP7

UDPmon Loss

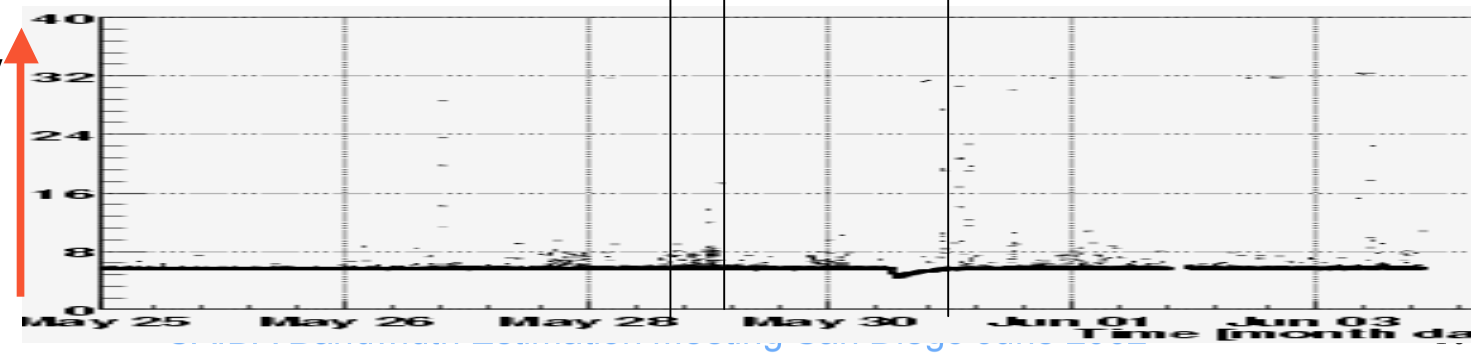
Throughput Mbit/s MAN – SARA ~750Mbit/s



RiPE 1 way SARA → RAL ms



RiPE 1 way RAL → SARA ms

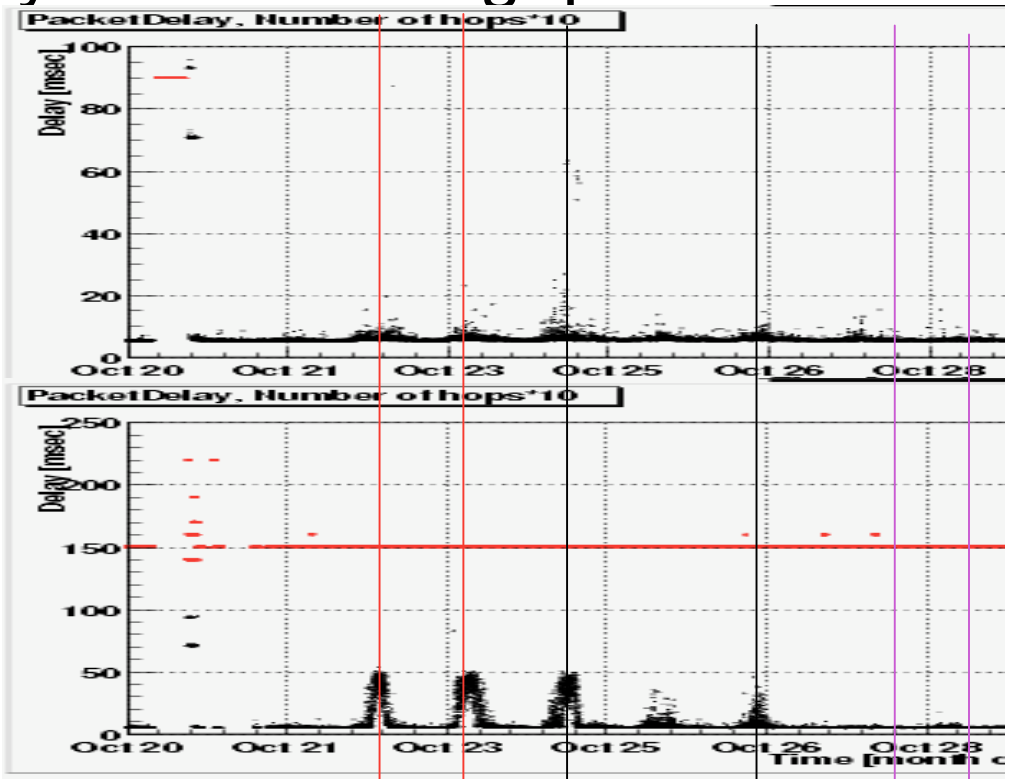


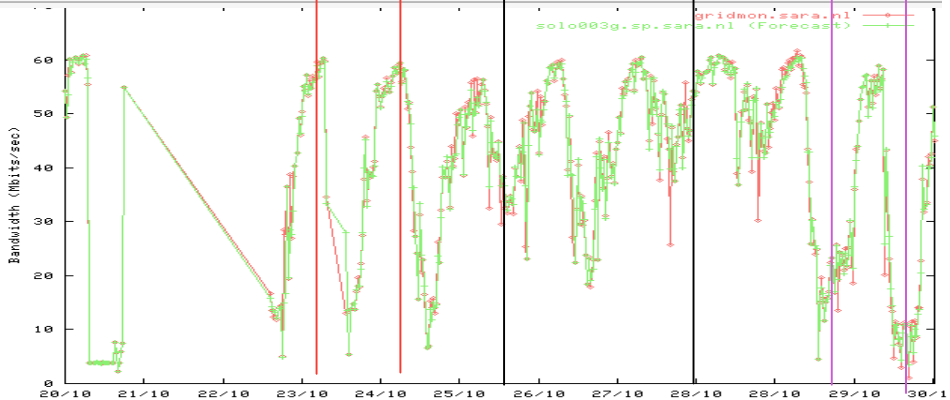
RIPE 1-way & TCP throughput UK-SARA

RIPE 1-way time ms
Sara → RAL
20 Oct 01

RIPE 1-way time ms
RAL → Sara

TCP Iperf + prediction
Mbit/s
UCL → Sara





iperf Pinger & UDPmon UK-Lyon From 25 May 02 – 04 Jun 02

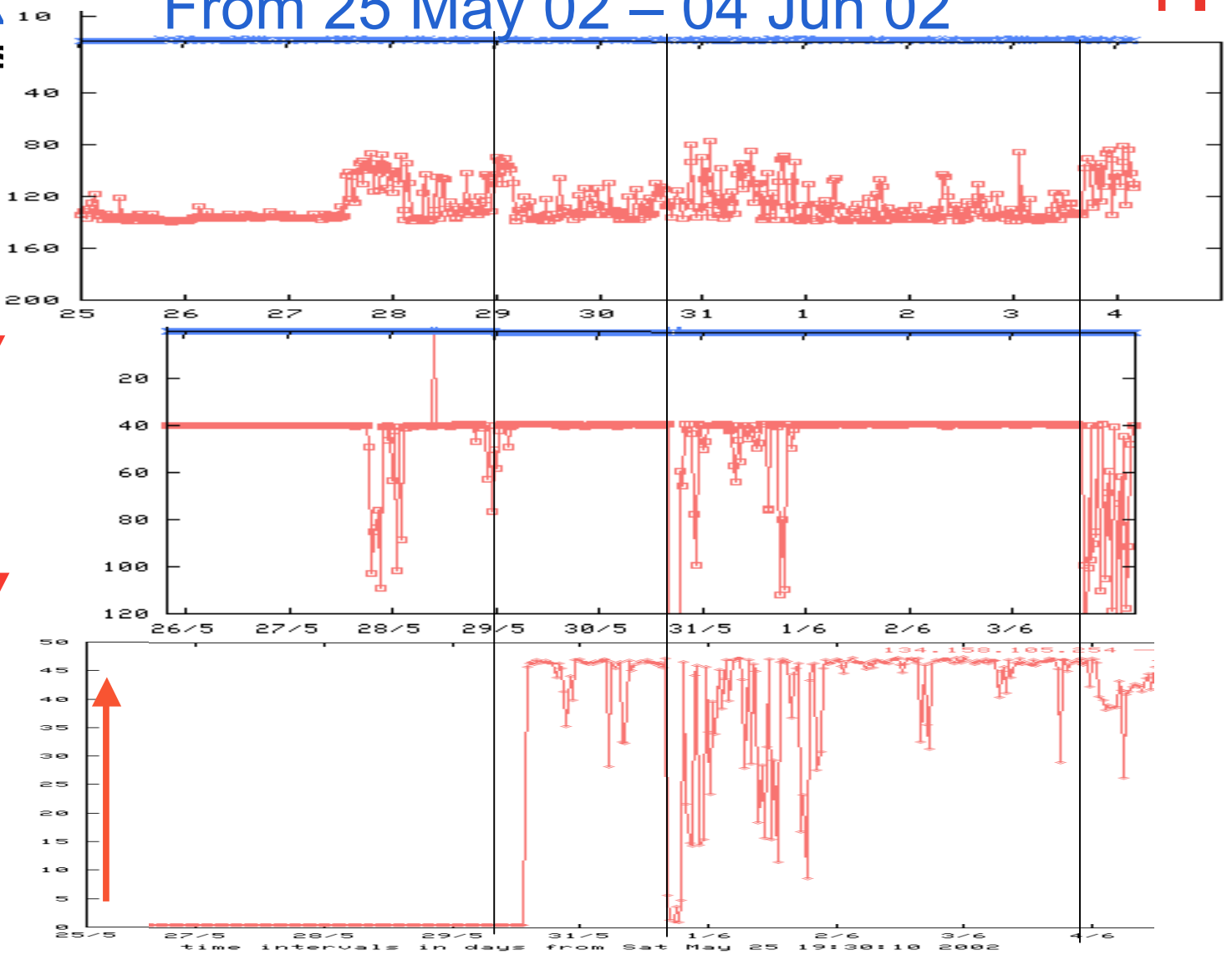
WP7

UDPmon Loss

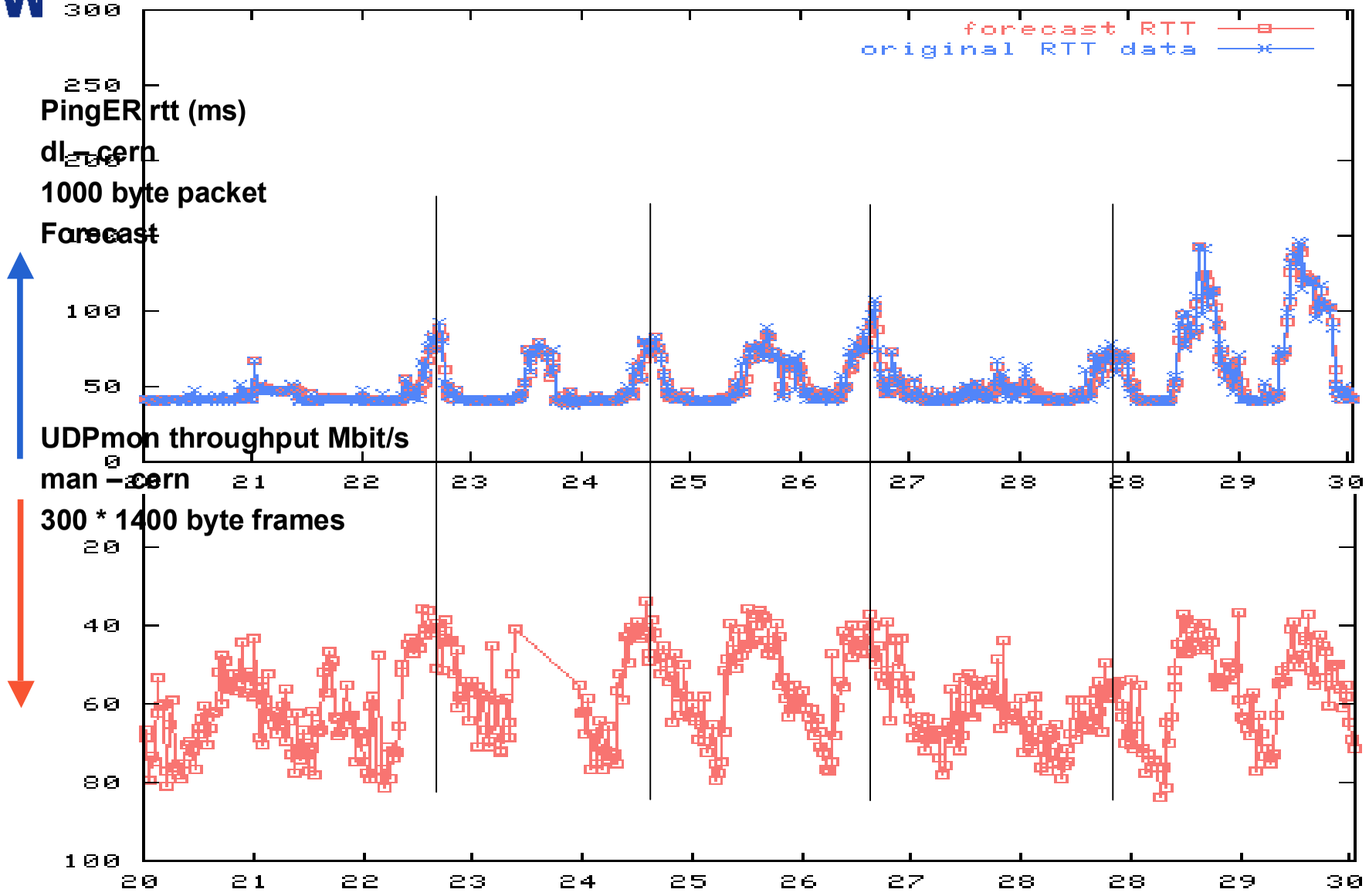
Throughput ~140 Mbit/s Man → Lyon

Ping Man → Lyon 40 ms rtt

Iperf TCP Throughput ~ 47 Mbit/s Man → Lyon 1048576 byte buffer



Ping & UDP throughput MAN-CERN From 20 Oct 01



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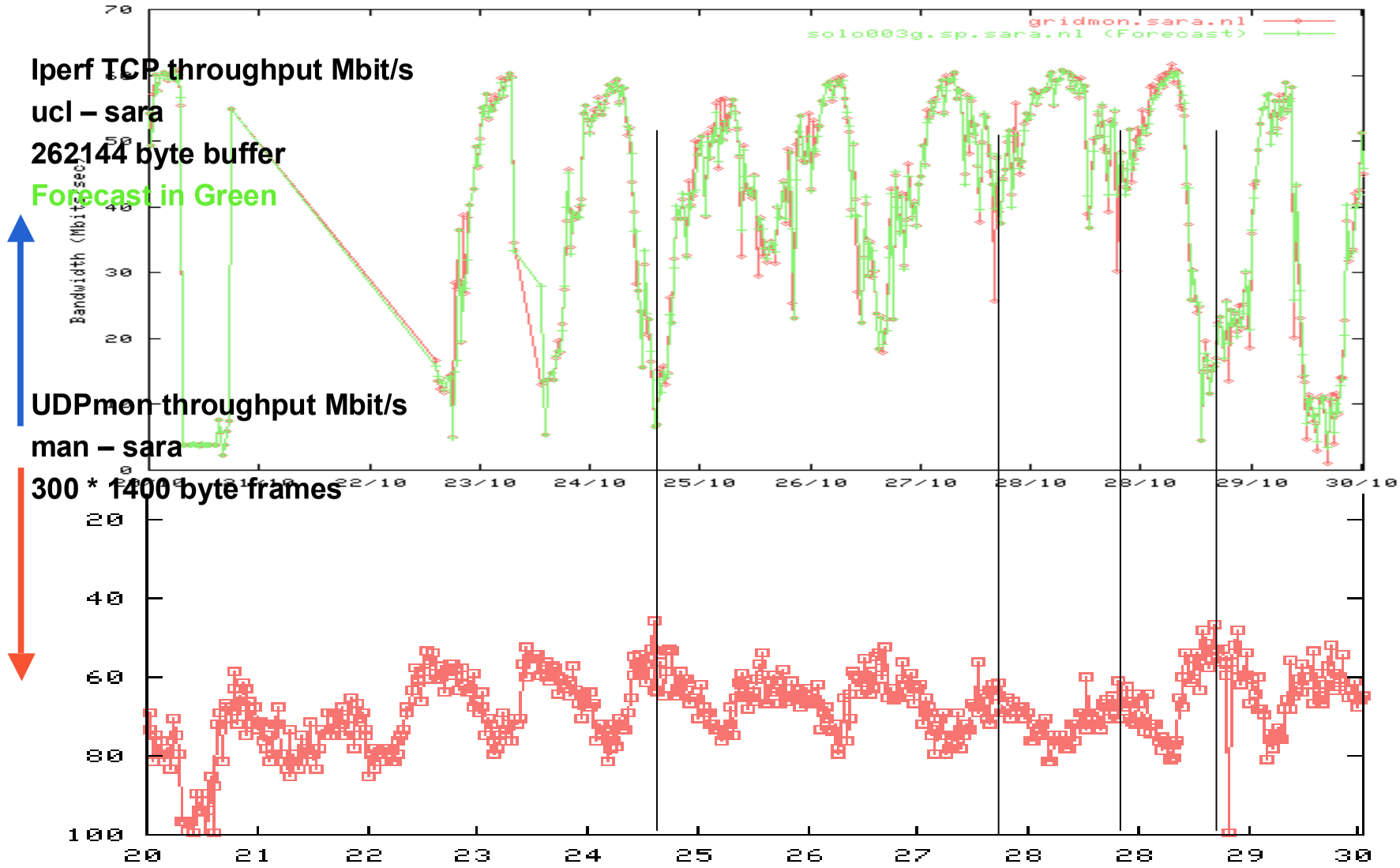
iperf TCP & UDPmon throughput MAN-SARA From 20 Oct 01



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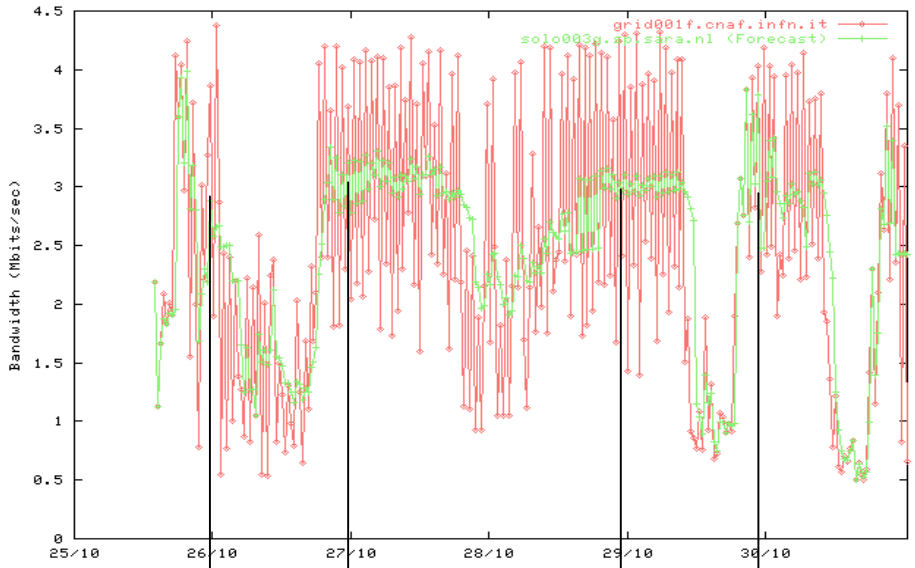
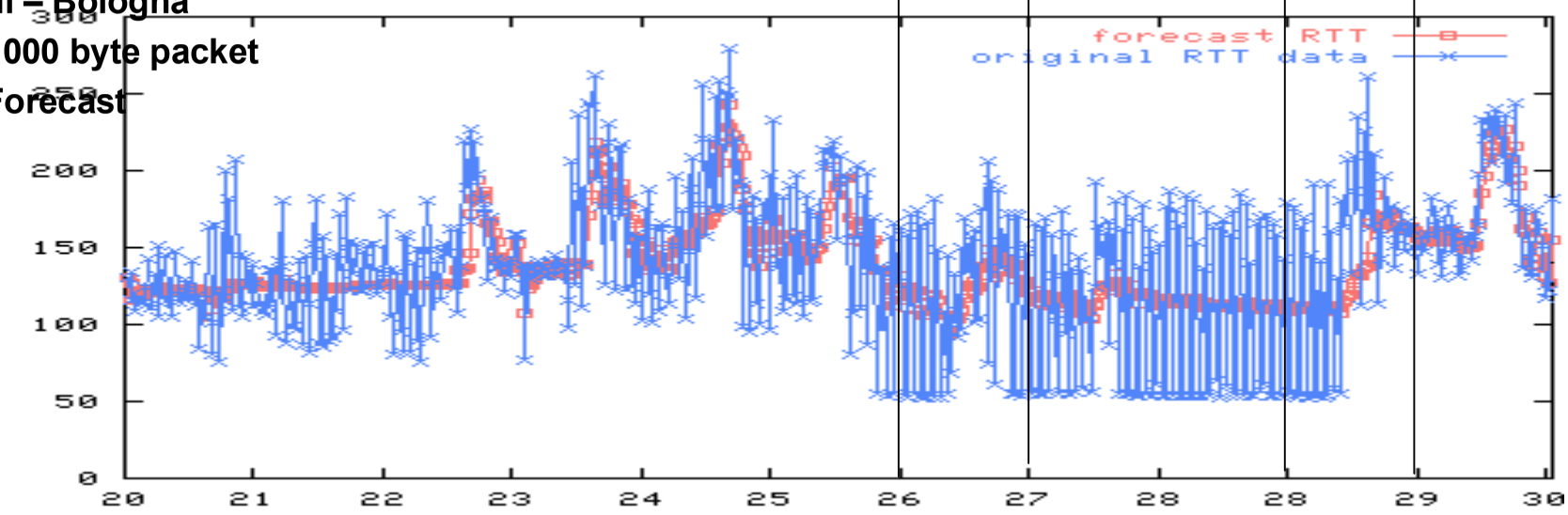
iperf & Pinger UK-Bologna From 20 Oct 01

Iperf throughput
ucl – Bologna
262144 byte buffer
Forecast in green



PingER rtt (ms)
dl – Bologna
1000 byte packet
Forecast



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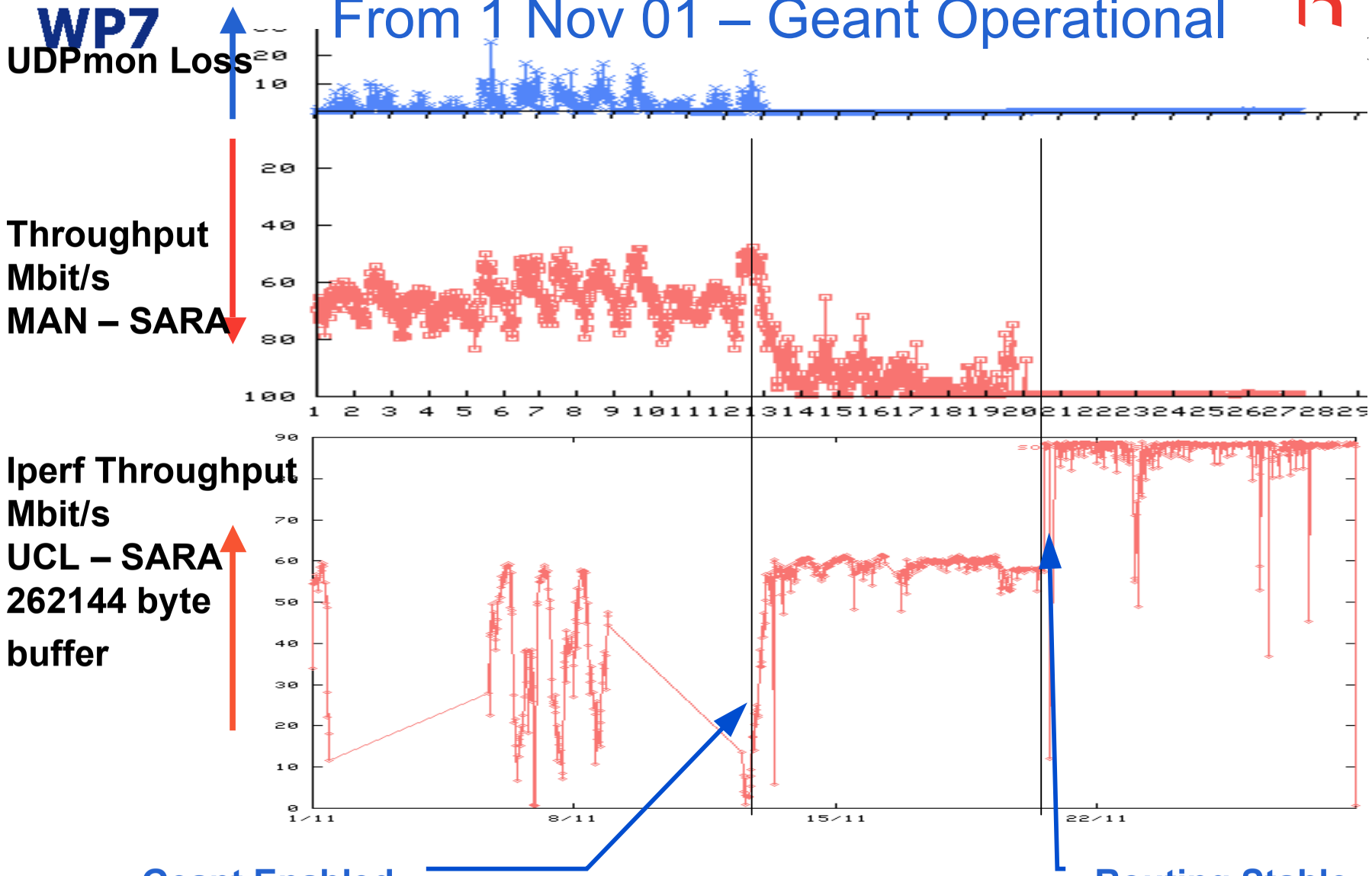
iperf & UDPmon throughput UCL-SARA From 1 Nov 01 – Geant Operational



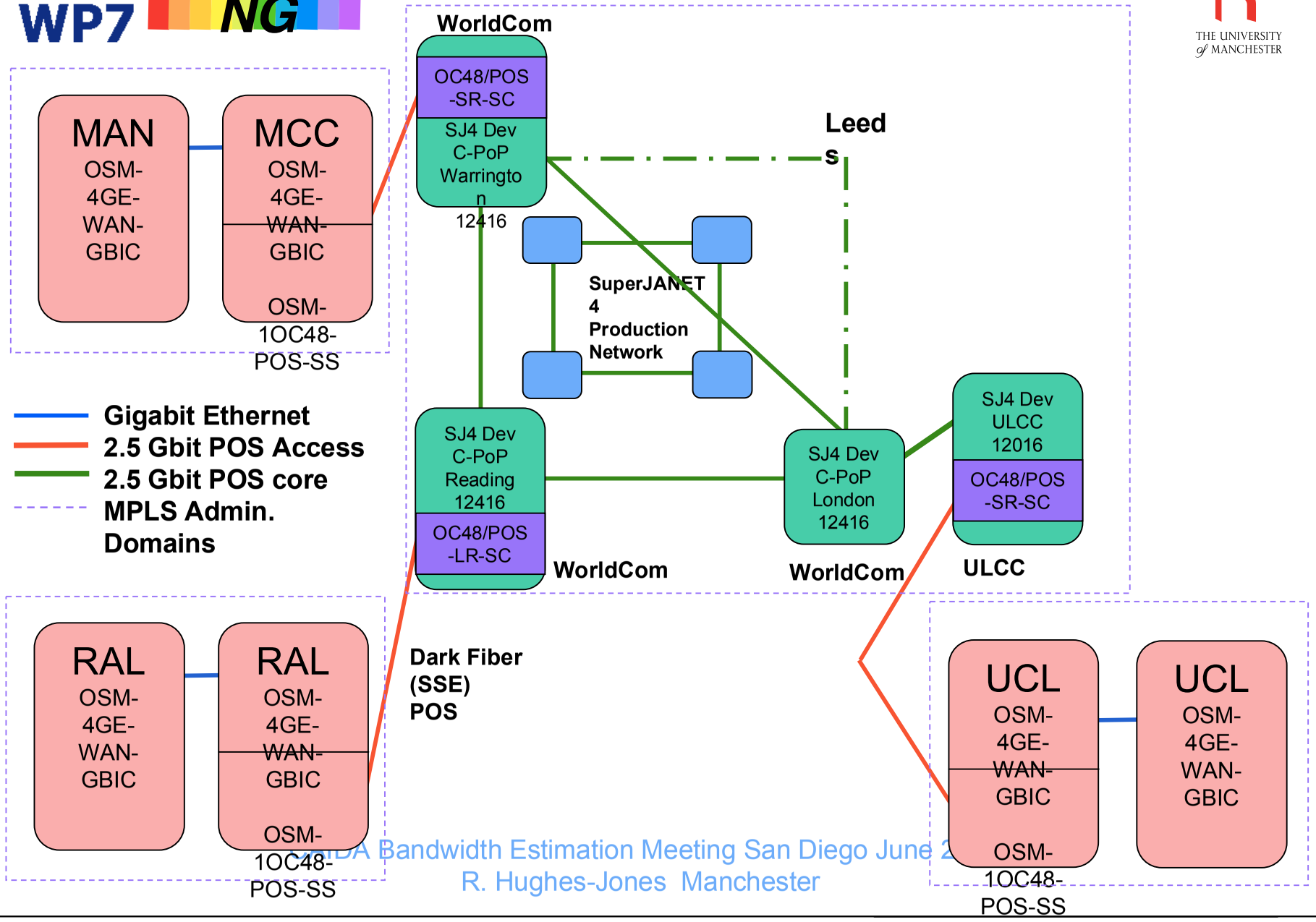
More Information Some URLs

- DataGrid WP7 Networking:
  http://www.gridpp.ac.uk/wp7/index.html
- DataGrid MapCentre
  http://ccwp7.in2p3.fr
- Motherboard and NIC Tests:
  www.hep.man.ac.uk/~rich/net/nic/GigEth_tests_Boston.ppt
- PPNCG Home page with Stop Press:
  http://ppncg.rl.ac.uk/
- PPNCG Page for monitoring Grid, HEP & Astronomy Sites
  http://icfamon.dl.ac.uk/ppncg/astronomy.html
- IEPM PingER home site:
  http://www-iepm.slac.stanford.edu/
- IEPM-BW site:
  http://www-iepm.slac.stanford.edu/bw

E-science core project

- Project to investigate and pilot:
  - end-to-end traffic engineering and management over **multiple administrative domains** – MPLS in core diffserv at the edges.
  - Managed bandwidth and Quality-of-Service provision. (Robin T)
  - High performance high bandwidth data transfers. (Richard HJ)
  - Demonstrate end-to-end network services to CERN using Dante EU-DataGrid and to the US DataTAG.
- Partners:CISCO, CLRC, Manchester, UCL, UKERNA plus Lancaster and Southampton (IPv6)
- Status:
  - **Project is running** with people in post at Manchester and UCL.
  - Project Tasks have been defined and Detailed planning in progress
  - Kit list for the routers given to Cisco
  - Test PC ordered
  - UKERNA organising core network and access links – SJ4 10Gbit upgrade
  - Strong Links with GGF

MB – NG SuperJANET4 Development Network (22 Mar 02)



The EU DataTAG project

- EU Transatlantic Girid project.
- Status: Well under way – People in post, Link expected Jul 02
- Partners: CERN/PPARC/INFN/UvA. IN2P3 sub-contractor
- US Partners: Caletch, ESnet, Abilene, PPDG, iVDGL …
- The main foci are:
  - Grid Network Research including:
    - Provisioning (CERN)
    - Investigations of high performance data transport (PPARC)
    - End-to-end inter-domain QoS + BW / network resource reservation
    - Bulk data transfer and monitoring (UvA)
  - Interoperability between Grids in Europe and the US
    - PPDG, GriPhyN, DTF, iVDGL (USA)

DataTAG Possible Configuration

multi-platform multi-vendor