DTN tests using the Géant Testbed Service (GTS)

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GÉANT Infoshare - Data Transfer Nodes: How Fast can your Data Travel?

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The GÉANT Testbeds Service

- “Testbed as a Service” (TaaS) GEANT3plus - April 2013
- Virtualization framework to expedite the deployment of novel network services and networked applications
- Intended for short term proof of concept testing and experimentation purpose only, and any usage related to production operations, business critical or otherwise is not supported
- Web based “Point-n-Click” GUI with script configuration options
GTS resources

- Available resources in Version 7.0.0 of GTS include:
  - **Hosts** (VMs with data ports and integrated monitoring in the GTS GUI; implemented using OpenStack)
  - Virtual circuits (Ethernet pipe with data ports; implemented using Network Service Interface (NSI) with 10 GE connectivity)
  - Virtual Switch Instances (VSIs) (fully virtualized OpenFlow switch instances (OpenFlow Specification 1.3 with data ports);
  - **BMS** (Bare Metal Servers. A BMS cannot have more than 1 port in current setup).
GTS hardware in testbed

• Dell PowerEdge R430
  • 2×20C/40T Intel Xeon E5-2660v3 @ 2.6 GHz,
  • 128 Gb ECC DDR4 2133 MHz RAM,
  • 6xSSD, 372 GB, 6.0 Gb/s HDD)

• Dell PowerEdge R520
  • 1×8C/16T Intel Xeon E5-2450 v2 @ 2.5 GHz,
  • 32 Gb ECC DDR3 1600 MHz RAM,
  • 2xSSD, 372 GB, 6.0 Gb/s HDD
GTS testbed tools

- **Iperf** - active measurements of the maximum achievable bandwidth on IP networks
- **GridFTP** - extension of the File Transfer Protocol (FTP) for grid computing, tool developed by Open Grid Forum (widely used tool for data transfers in science projects and supercomputer centers)
- **FDT** (Fast Data Transfer) - open source application; in basic using numerous TCP streams (managed pool of buffers through one or more TCP sockets)
- **XrootD** - open source application, extension of ROOT daemon; using load balancing for clients between servers
- Ubuntu 18.04 LTS (some tests were also done with CentOS 7)
- Network:
  - 10Gbit/s dedicated fiber/lambda links
  - No QoS (best effort), no control over routing
Topology/Tests scenarios

• 512Gbyte file transfer
• VM Testbed:
  • Local test between servers in Amsterdam
  • Test between servers in Amsterdam and London
  • 1xCPU, 2xCPU, 4xCPU VMs
• BMS Testbed:
  • Hamburg <-> Paris (R430)
  • London <-> Prague (R430 and R520)
Test results

- Comments:
  - No control over routing, no QoS...
  - BMS test -> disk to disk transfer
  - VM test -> memory to memory transfer (due to low disk space available on VMs)
  - Test were done on 10Gbps NIC (100Gbps NiCs were not available)
  - GTS servers are NOT DTN “hi-end hardware”

- Better results on BMS R430
- Poor results on BMS R520 (issues at London node?)
- VM tests – „the same“ (memory to memory)
- XRootd is highly dependent on hardware resources
- BMS vs Docker BMS (R430):
  - 2-4% in iperf results
  - 5-7% difference for FDT
  - Same results for gridFTP and Xrootd
Thank you

Any questions?

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DTN over GTS test results (all in one)

Network performance in Gbps

AMS-AMS | AMS-LON | AMS-AMS | AMS-LON | AMS-AMS | AMS-LON | LON - PRA (R520) | LON - PRA (R430) | HAMB - PAR (R430) | LON - PRA (R430) | HAMB - PAR (R430) | Docker/BMS

1 CPU | 2 CPU | 4 CPU | BMS | Docker/BMS

DTN over GTS R430 - BMS vs Docker

Network performance in Gbps

LON - PRA (R430) | HAMB - PAR (R430) | HAMB - PAR (R430) | LON - PRA (R430) | BMS | Docker | BMS | Docker