Notes on noted

Coralie Busse-Grawitz
Speaker: Tony Cass
& Edoardo Martelli, Mario Lassnig, Andrea Manzi, Oliver Keeble
A Physicist

Fabiola

Icons made by Freepik from Flaticon
Coralie
A Network Engineer
LHCONE..?
We could load-balance...

NOTED.
Smooth and large data transfers need network optimization.

Network Optimised Transfer of Experimental Data

Source: http://wlcg.web.cern.ch
2018 Proof of concept—FTS impact

FTS transfer speed increase when added LHCONE link
2018 Proof of concept—CERN Network impact

NL-T1 2x10G LHCOPN links saturated

CERN router went in software forwarding while trying some tricks to push more traffic on the LHCONE link

No major impact on CERN LHCONE 100G access
To load-balance dynamically, we tackle these key challenges

- **when to do**: Obtain transfer start & size information
- **what, and**: Load-balance only during the transfer
- **how, and**: Find load-balancing mechanism
- **how well**: Measure impact
To load-balance dynamically, we tackle these **key challenges**

- Obtain transfer start & size information
- Load-balance only during the transfer
- Find load-balancing mechanism
- Measure impact
To obtain transfer information, we interface with **Fabiola’s transfer tool**.
To obtain transfer information, we interface with Rucio and FTS
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To load-balance dynamically, we tackle these **key challenges**

- Obtain transfer start & size information
- Load-balance only during the transfer
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To load-balance dynamically, we tackle these **key challenges**

- Obtain transfer start & size information
- Load-balance *only during* the transfer
- Find load-balancing mechanism
- Measure impact
When a large transfer starts, we trigger a SDN controller.

Router config: netconf via PyEZ
We construct the SDN action with IP prefixes from AGIS/CRIC
To load-balance dynamically, we tackle these **key challenges**

- Obtain transfer start & size information
- Load-balance *only during* the transfer
- Find load-balancing mechanism
- Measure impact
As a first load-balancing mechanism, we automated BGP multipath to NL-T1
To load-balance dynamically, we tackle these **key challenges**

- Obtain transfer start & size information
- Load-balance *only during* the transfer
- Find load-balancing mechanism
- Measure impact
To demonstrate the impact measurements, we transferred 200 TB from CERN to NL-T1
To obtain transfer information, we interface with Rucio and FTS.
The Transfer Broker successfully observed how the Rucio queue fills up.
The Transfer Broker successfully observed **how the FTS queue fills up**

https://monit-grafana.cern.ch/dashboard/snapshot/m6QFfAzTpsMdzlsIFh8A7Av6nhXspJRAT?orgId=25&fullscreen&panelId=6
We trigger the load-balancing...
We trigger the load-balancing, and see how the traffic shifts.

Load-balancing

Simultaneously: traffic in LHCOPN from 50 G to 25 G

From GEANT

51.09 G

To GEANT
Future work...

Load-balancing:
segment routing in MPLS
Future work...

Load-balancing: segment routing in MPLS

Use StackStorm as SDN controller
Future work...

Load-balancing:
segment routing in MPLS

Use StackStorm as
SDN controller

Also cover remoteIO/WMagent
(some jobs produce ~1PB load, heavily used by e.g. CMS)
Conclusion: From this...
Conclusion: ... to this!
Questions?

tony.cass@cern.ch
coralie.busse-grawitz@cern.ch