pre-DC tests: T0 export ATLAS

A. Forti
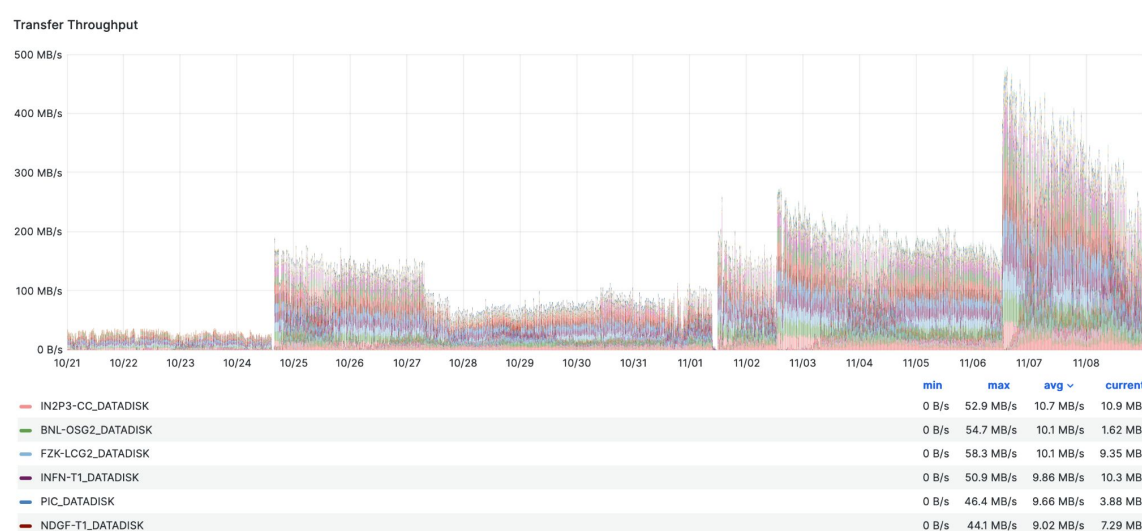
DOMA general

06 December 2023

Reasons

- To test CERN throughput of course…. but also
- We have been testing most sites with very low level injections - basically functional tests
  - 40 Mb/s export T0 - T1 and 20 Mb/s all other links
- To tune the injection/deletion rates to have a more constant throughput than in 2021

- Higher rates need also also tuning

Rates

| Site	Cloud	T0 exp. full (Gb/s)	Total half rate (Gb/s)
TRIUMF-LCG2	CA	21.4	10.7
FZK-LCG2	DE	25.6	12.8
pic	ES	9.0	4.5
IN2P3-CC	FR	32.5	16.2
INFN-T1	IT	18.3	9.2
NDGF-T1	ND	5.6	2.8
SARA-MATRIX	NL	11.1	5.6
RAL-LCG2	UK	32.5	16.2
BNL-ATLAS	US	52.6	26.3
All T1s (avg)		208.6	104.3

Ganges during the test

- Injections every 15 minutes

- Priority always lower than any production transfer

- 30/11/23 10 am - 16 pm

  - Half export rates

  - Average file size ~6 GB

  - Average deletion per hour few hundreds

- 30/11/23 16 pm - 01/12/2023 17 pm

  - Full export rates

  - Average file size ~2 GB

  - Average deletions rates per hour 10k-20k

    To stress injections/deletions

- Change in settings made a significant difference to ATLAS throughput

General T0 -T1s rates

Transfers Throughput ⓘ

Changes applied

	max ⌄	avg	current
0	418 Gb/s	170 Gb/s	88.3 Gb/s
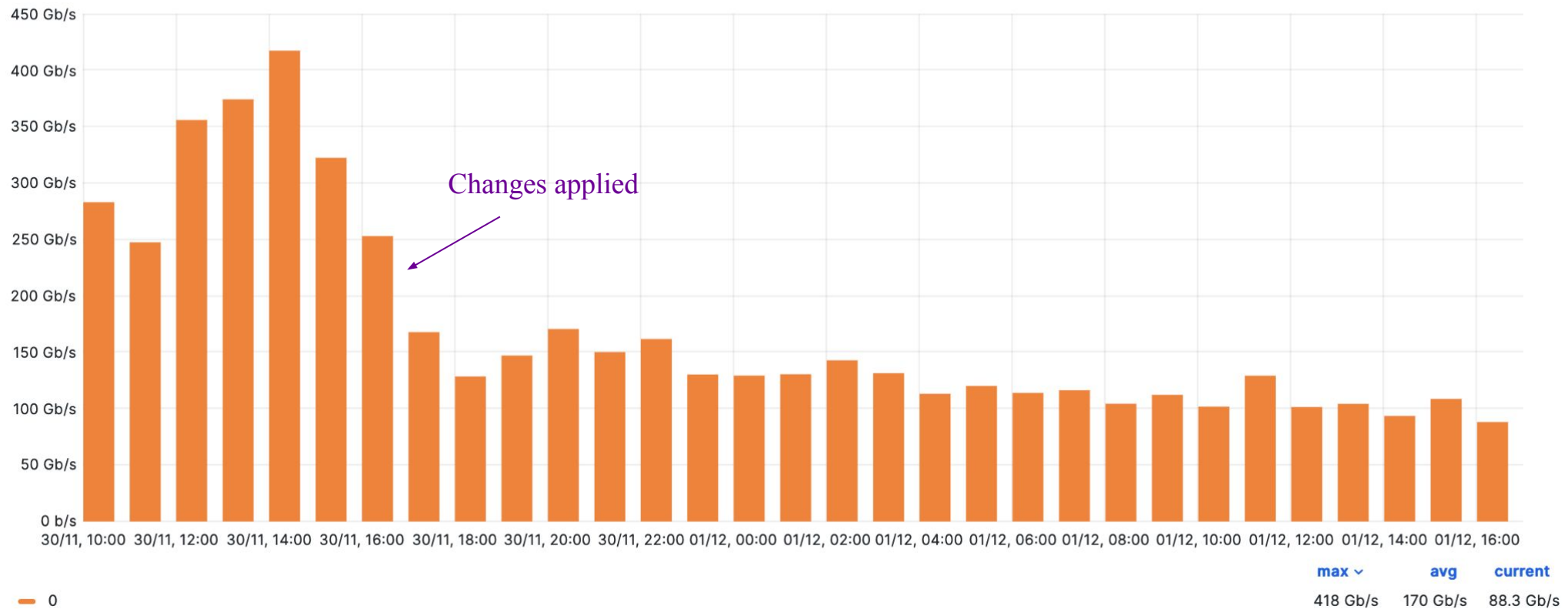
- Max rate 418 Gb/s
- Overall average 170 Gb/s ← Need to understand the limitations
- Avg first 6h 334 Gb/s

Rates per T1

Site	Cloud	T0 exp. full ATLAS (Gb/s)	Avg first 6h	Total avg	Achieved Max
TRIUMF-LCG2	CA	21.4	44.6	19.7	59.9
FZK-LCG2	DE	25.6	51.6	24.6	58.4
pic	ES	9.0	46.8	11.7	58.1
IN2P3-CC	FR	32.5	36	18.4	50.2
INFN-T1	IT	18.3	44.6	19.6	57.3
NDGF-T1	ND	5.6	30.8	6.3	35.8
SARA-MATRIX	NL	11.1	44.3	13.3	63.7
RAL-LCG2	UK	32.5	1.7	8.47	19.7
BNL-ATLAS	US	52.6	36.8	32.5	48.8
All T1s (avg)		208.6	337.2	155.0	411.0

Transfers Throughput
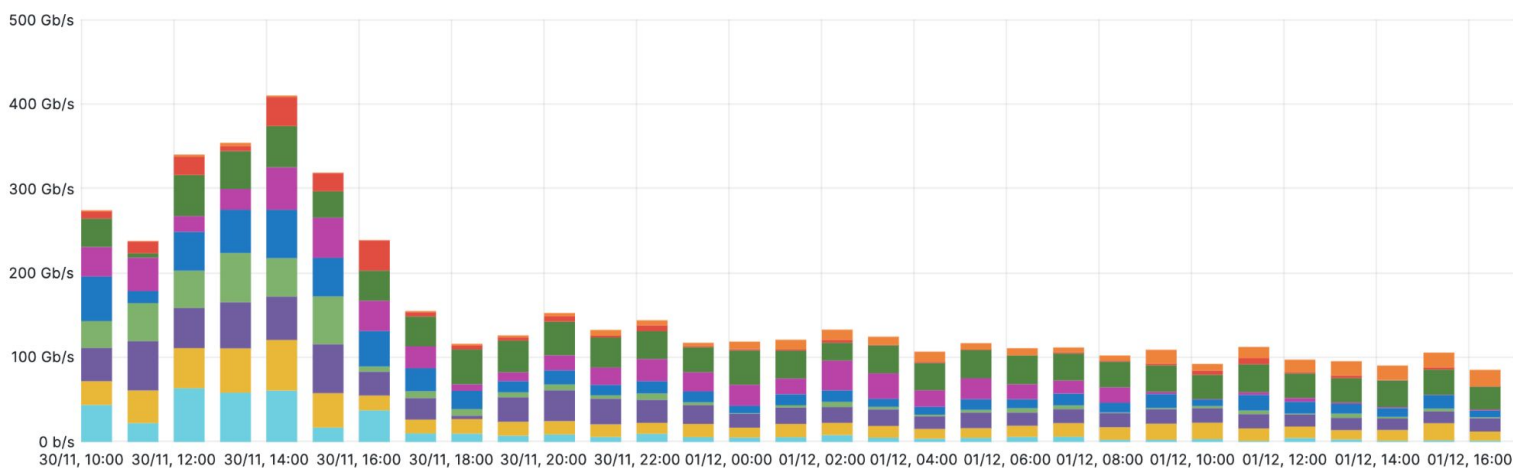
IN2P3-CC
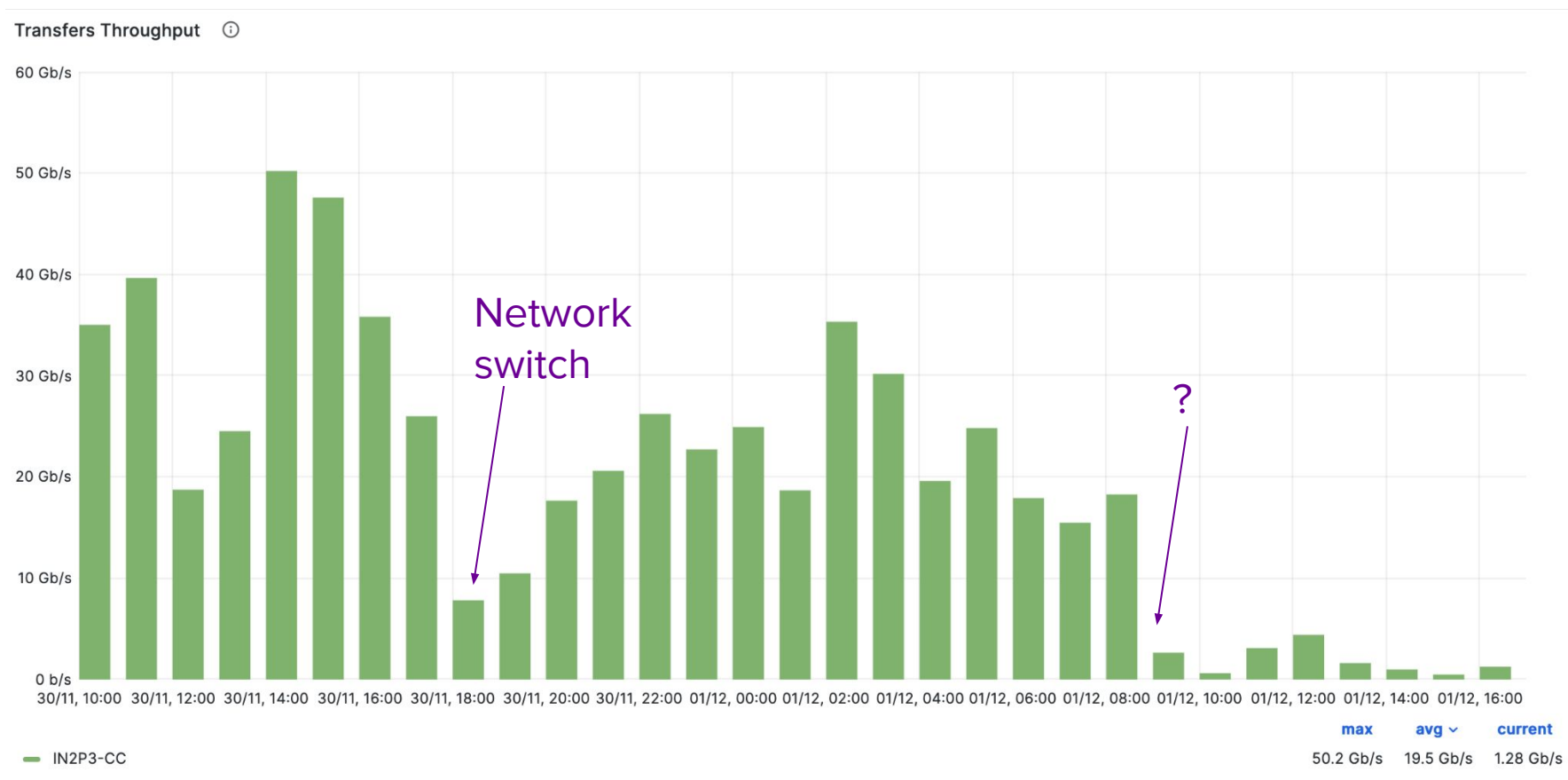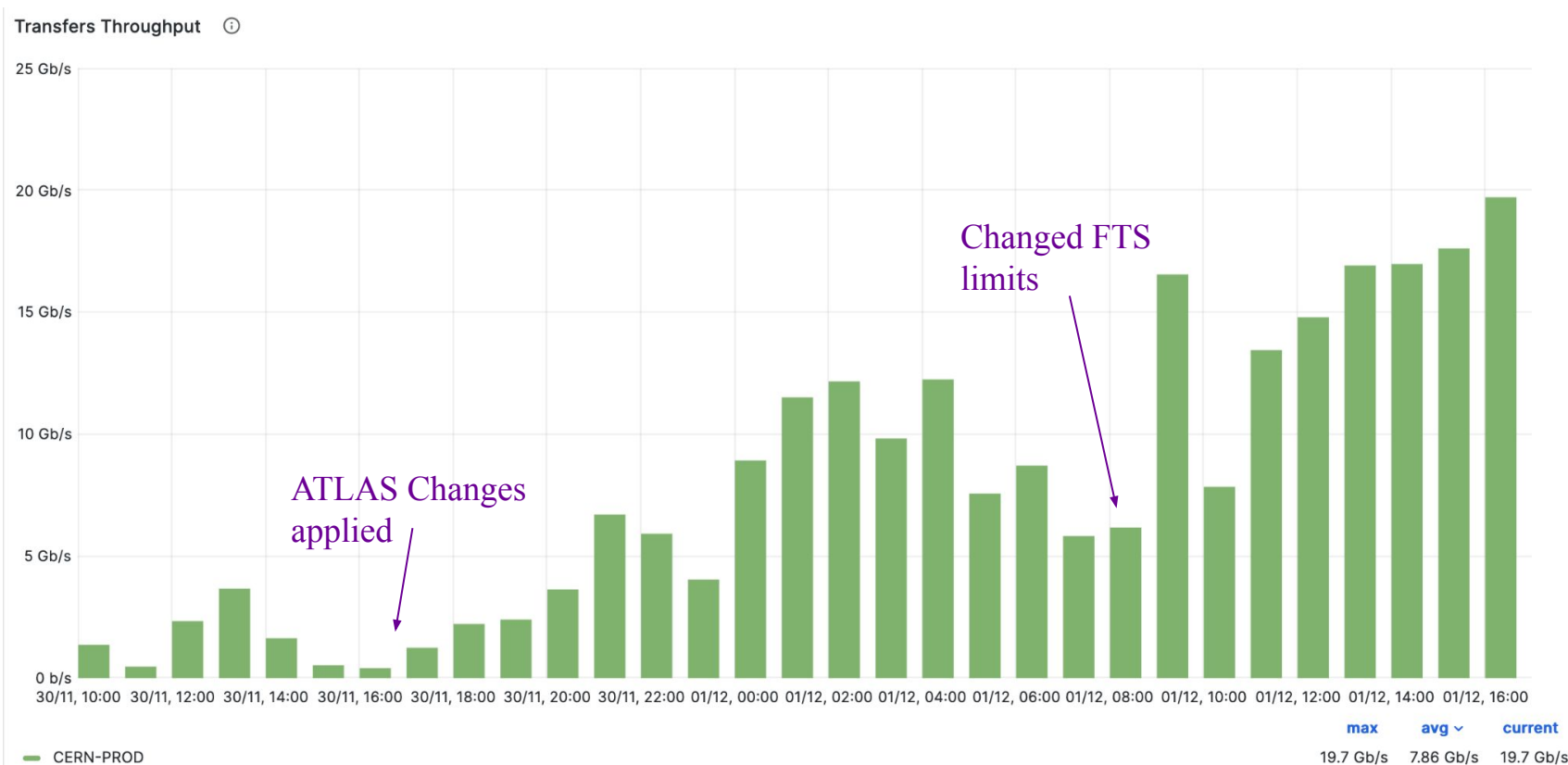

- ## 30/11/23 18:00
  - LHCOPN went down and LHCONE backup kicked in
- ## 01/12/23 8:00
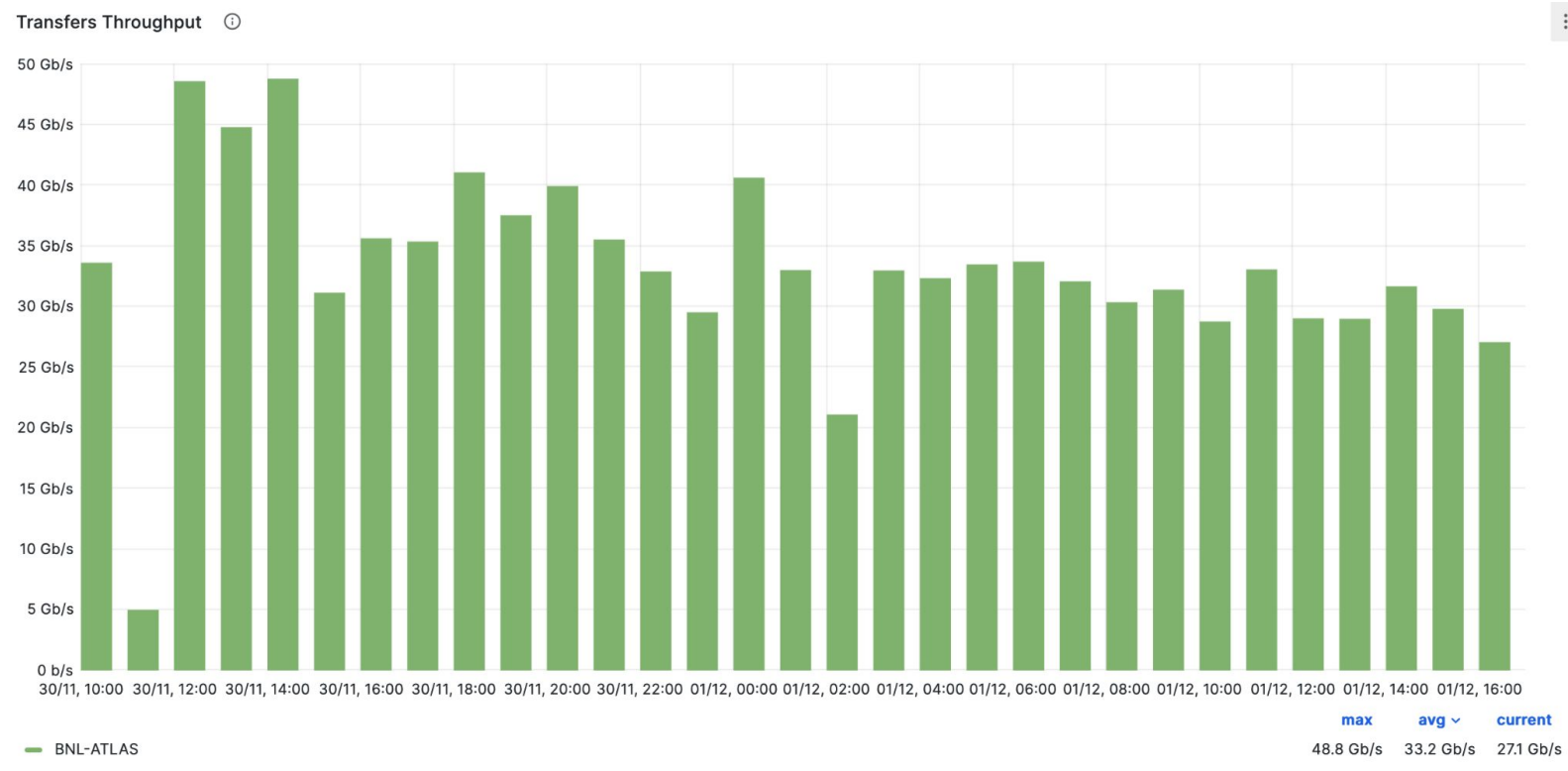 - Not clear why transfers dropped for IN2P3-CC

RAL

- Opposite behaviour than other sites respect to larger files (?)
- There was also a FTS limit
  - Increased from 300 ➜ 900
- Still not close to the rates - bandwidth is there though
  - Needs more tests?

BNL

- Nice constant rates but could go higher
  - Didn't get to the 52 Gb/s not even with max
    - Rates will be higher during DC24
  - Bandwidth in CRIC 200 Gb/s
- File size doesn't make as much difference as in other place
  - Maybe there is another limit to keep transfers constant at a certain level?

Conclusions

- Overall positive exercise
- Useful also to identify some limits which require more investigation
  - Changes in file size and number of transfers
  - Check sites FTS limits for all T1s
- Most sites where well beyond the expected rates
  - Rates for DC24 will be slightly higher
- Single T1s tests to tune if changes
- What to do about Nikhef....
  - 400 Gb/s on LHCOPN but no tape ➜ no T0 export
    - Adding it as a T1 could add another 200 Gb/s to ATLAS traffic
      - But pity to test it at T2 level