



# Transfer activity within ATLAS

**S. Jézéquel**

**LAPP  
IN2P3/CNRS  
Annecy-Le-Vieux (France)**



# Transfer process

- ▶ Presentation restricted to scheduled transfers
- ▶ Interactive transfer by user or application still negligible
- ▶ **Description of scheduled transfer : File Transfer System**
  - ▶ **Current usage**
    - ▶ 3 channels defined to each T2
      - ▶ Associated T1 → T2 (usually very fast)
      - ▶ Other T1s → T2 (expected to be fast)
      - ▶ Other sites → T2 (best effort)
    - ▶ Number of // streams and // files optimised once
  - ▶ **Future usage**
    - ▶ Point to point optimisation
    - ▶ Transfer parameters optimised according to recent history

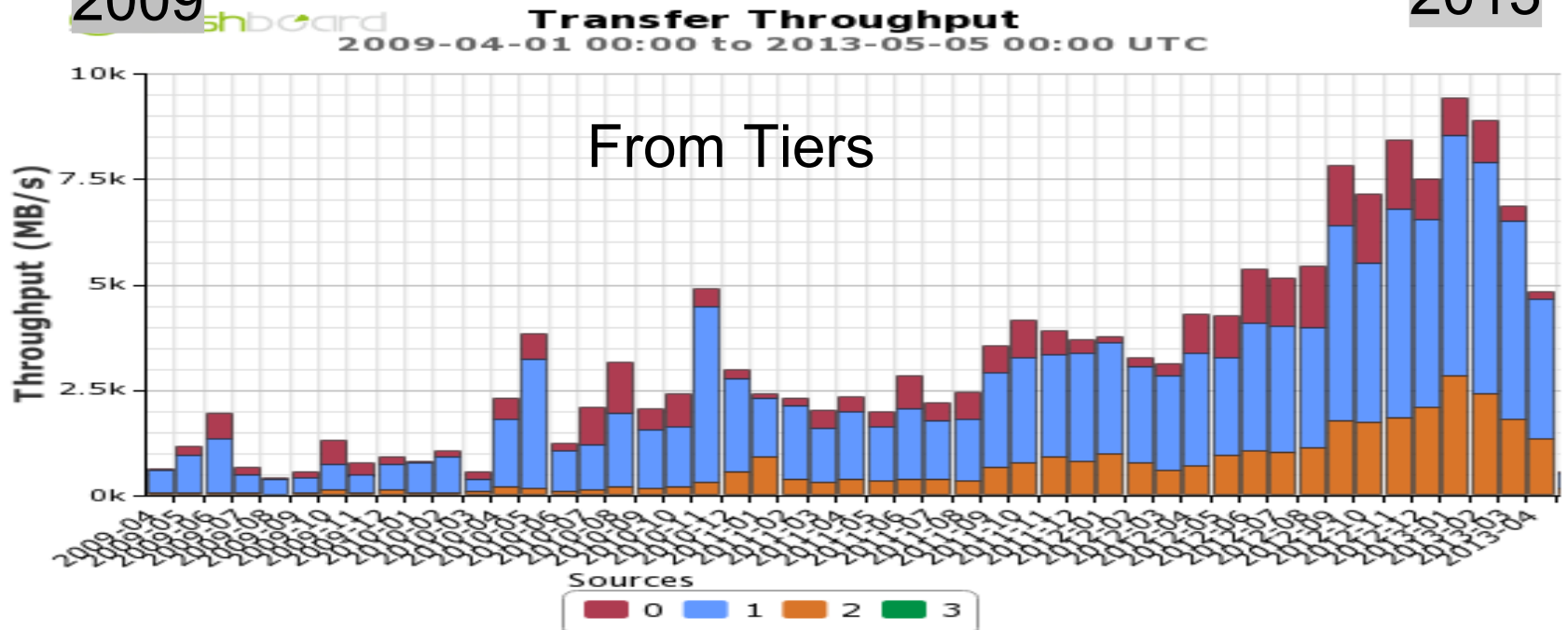
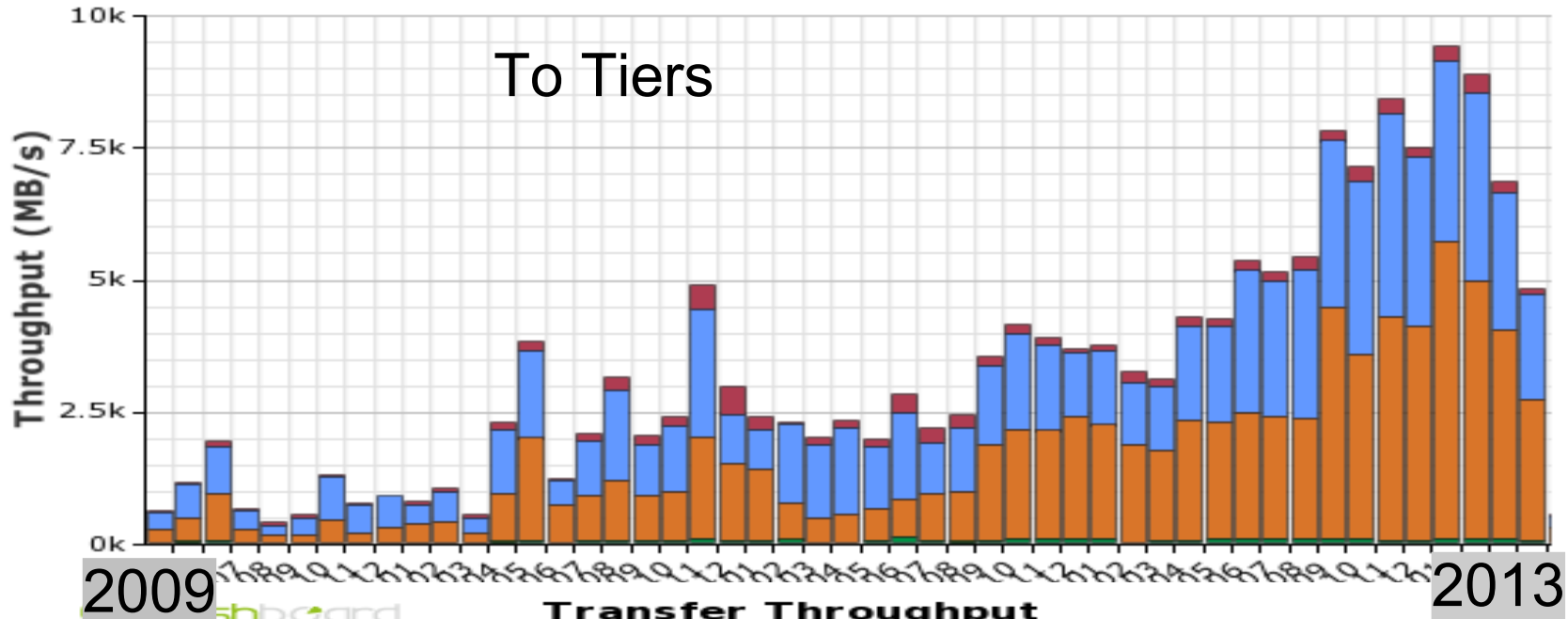


# Global ATLAS activity

dashboard

## Transfer Throughput

2009-04-01 00:00 to 2013-05-05 00:00 UTC



1 bin  
=  
1 month



## ◆ T0 export :

- ◆ Data export from ATLAS detector
- ◆ To be done within hours
- ◆ Destination T1

## ◆ Data Consolidation :

- ◆ Preplace data according to pre-defined policy
- ◆ To be done within a day
- ◆ Destination : T1 and mostly T2s

## ◆ Data Brokering :

- ◆ Increase number of replicas based on effective data access
- ◆ To be done within hours
- ◆ Destination : Mostly T2s



## ♦ Functional test :

- ♦ Permanent test with small files

## ♦ Production :

- ♦ Transfer input/output files between prod site and master copy (T1)
- ♦ To be done within an hour
- ♦ Destination : T1 ↔ T2s

## ♦ User/group subscription :

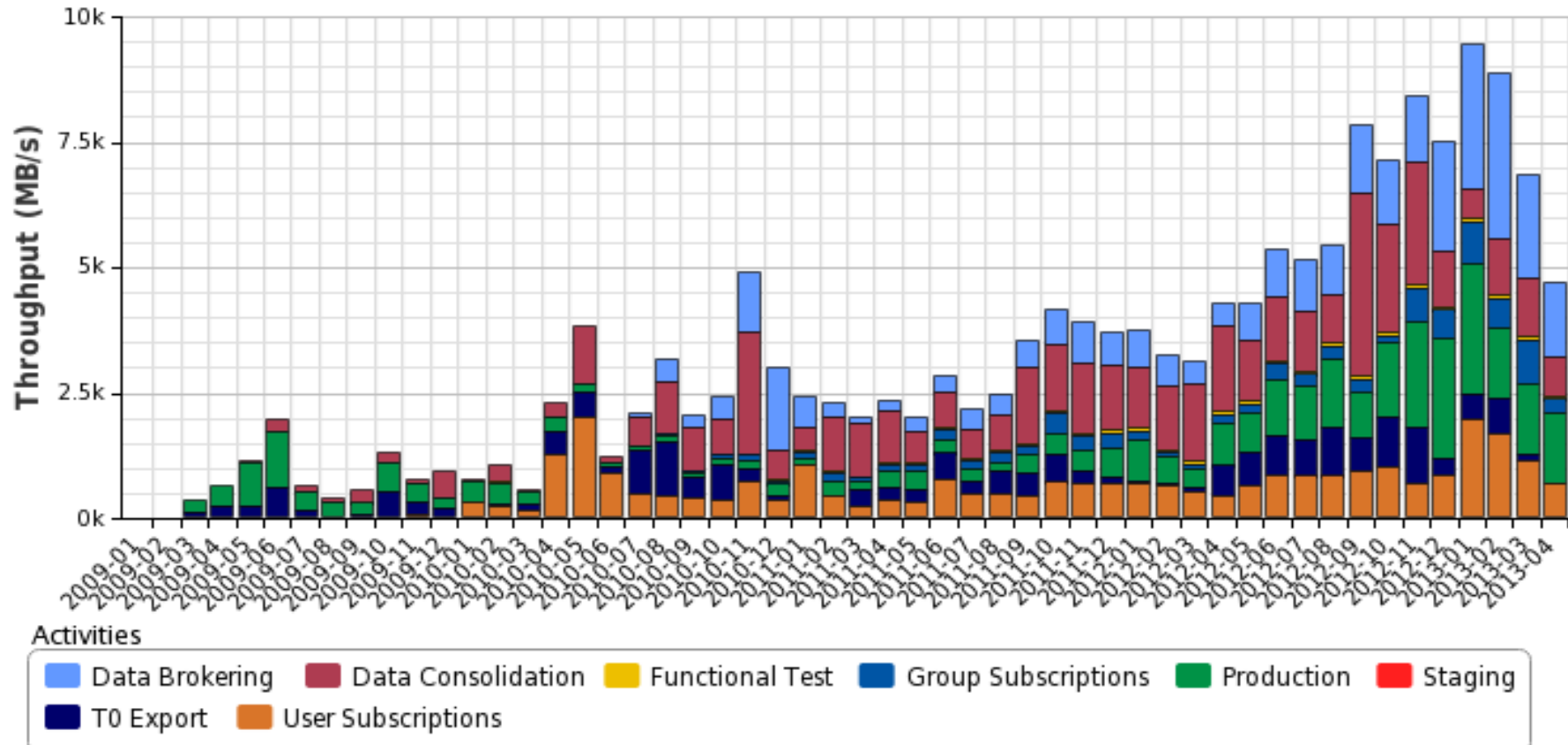
- ♦ Transfer data to location with disk quota
- ♦ To be done within a day
- ♦ Destination : Any Grid site



# Global ATLAS activity (2)

dashboard

**Transfer Throughput**  
2008-12-28 00:00 to 2013-04-30 00:00 UTC

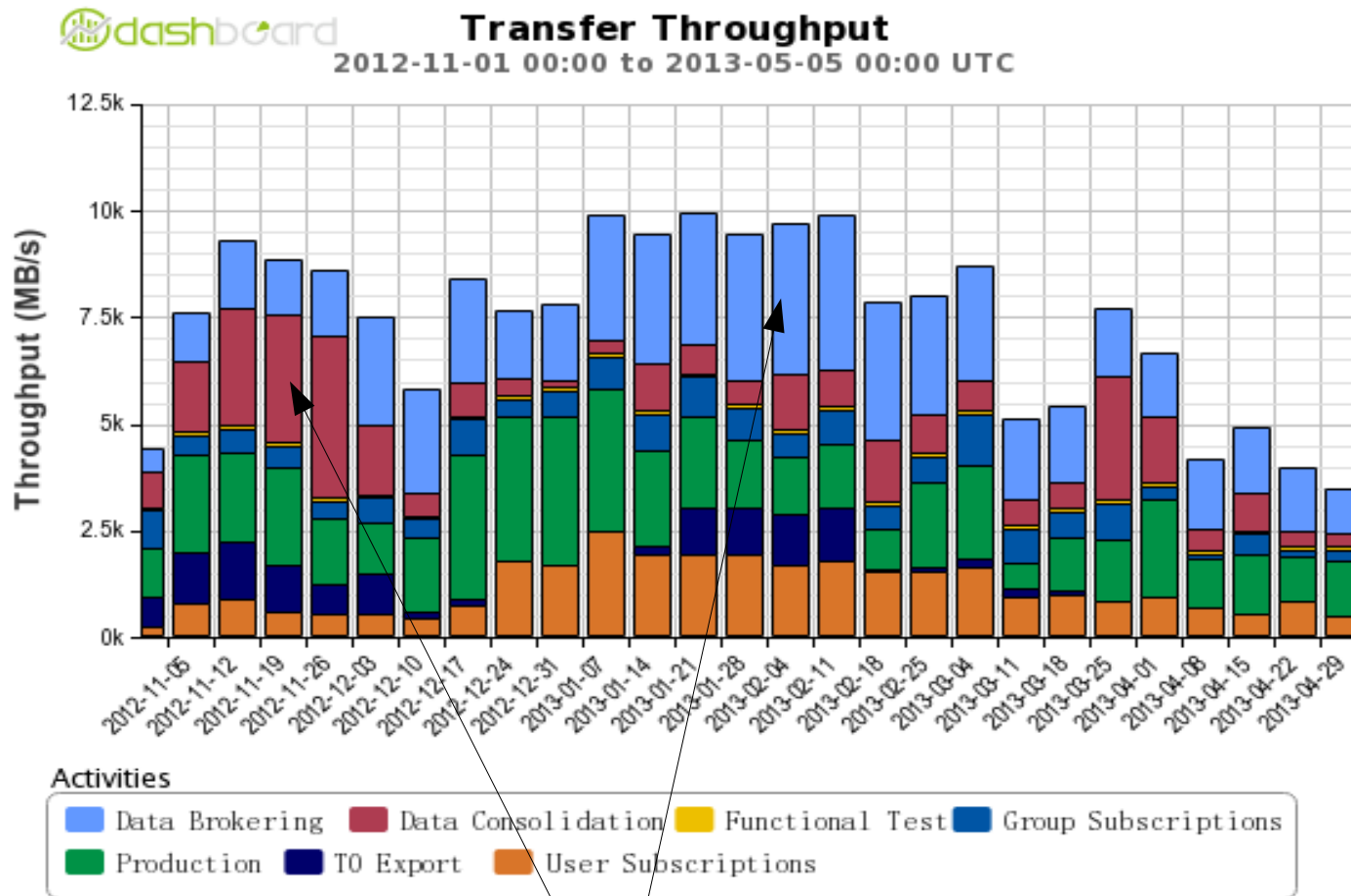


## Reasons for increase of network usage

- More real/simulated data to handle
- Processing of big input files no more restricted to T1s
- Less preplaced data to optimise disk usage



# Transfer activity: Last 6 months



◆ Peak activities associated preparation of major conferences



- ◆ **Transfer rate reached 5-10 GB/s permanently**
  - **ATLAS adapts to available network infrastructure**
- ◆ **Many different activities competing for network resources**
- ◆ **T2s have become major destination for transfers**





# Transfer to T2s

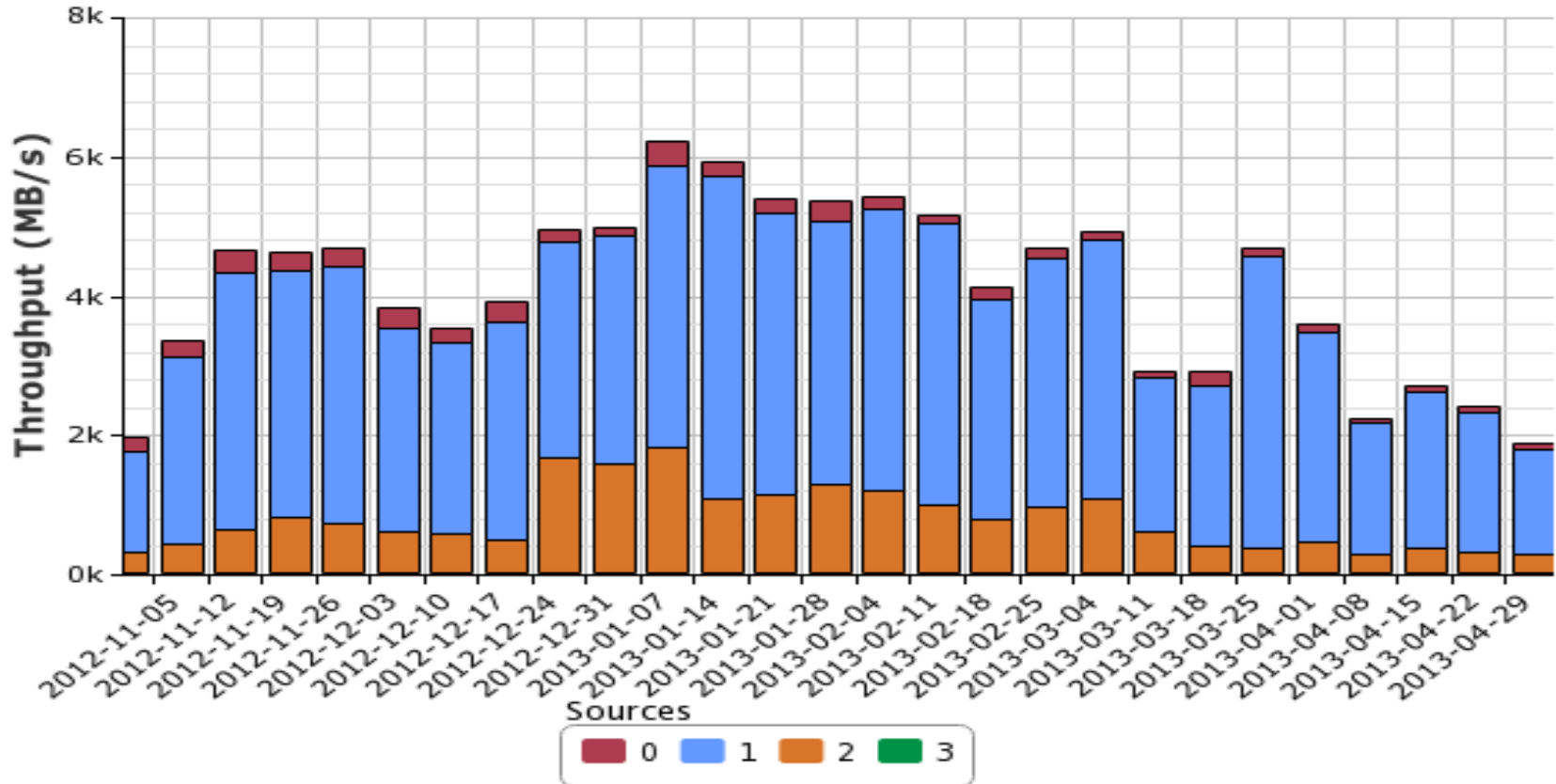
# Transfer activity to T2s: Last 12 months



dashboard

## Category of source site Transfer Throughput

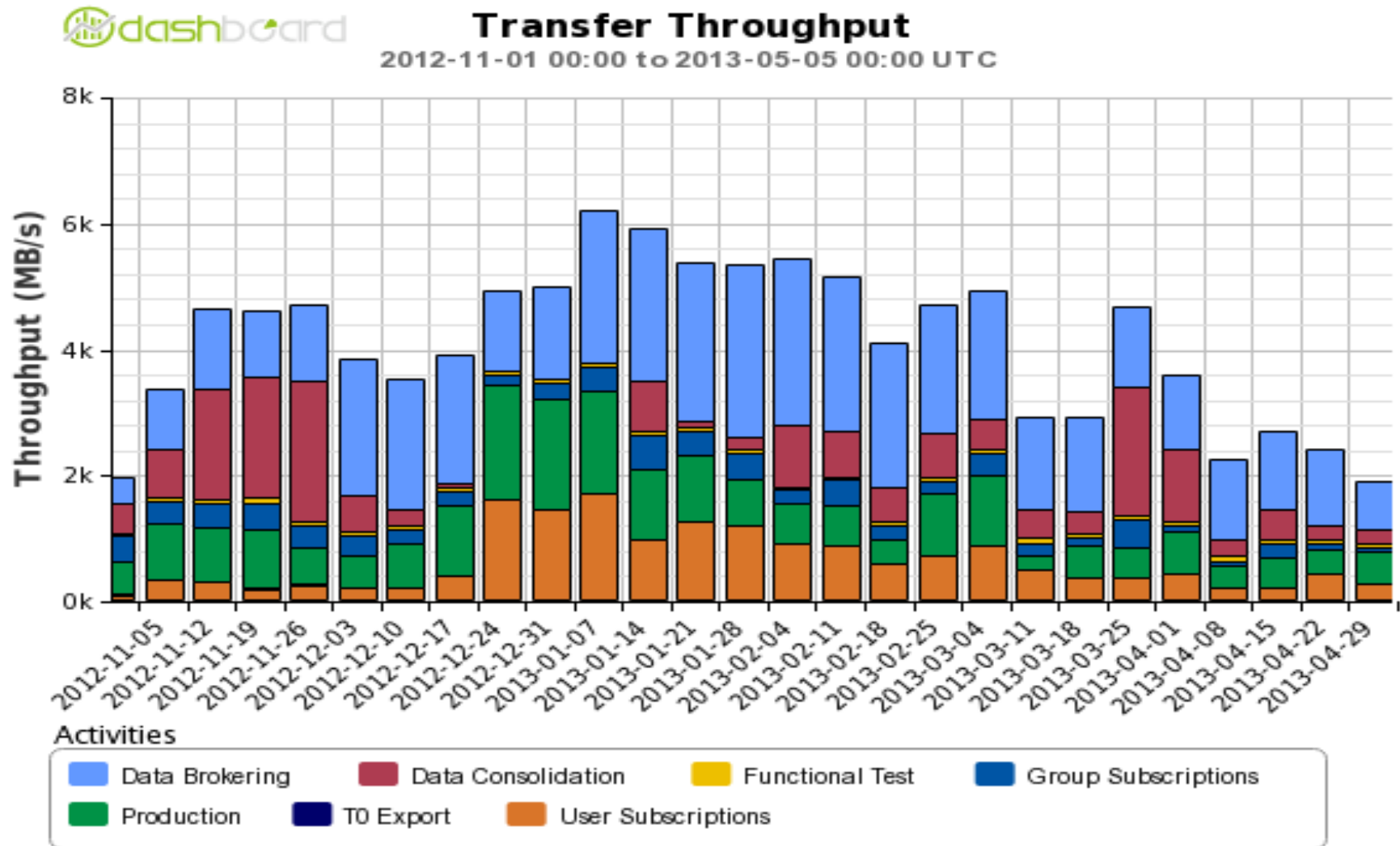
2012-11-01 00:00 to 2013-05-05 00:00 UTC



Source : T1s most of the time



# Transfer activity to T2s : Last 6 months

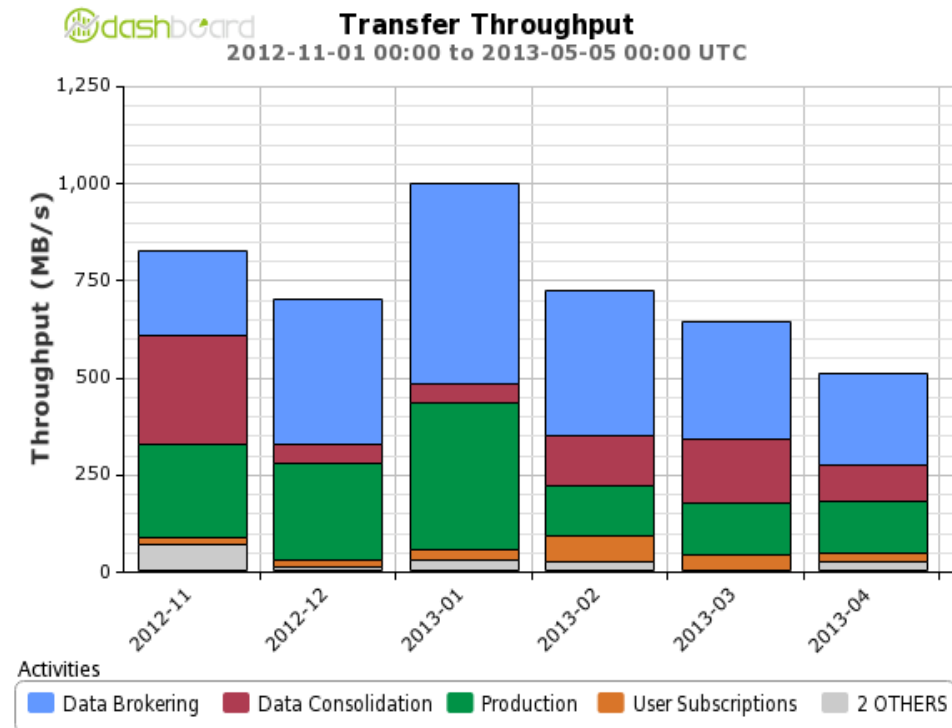
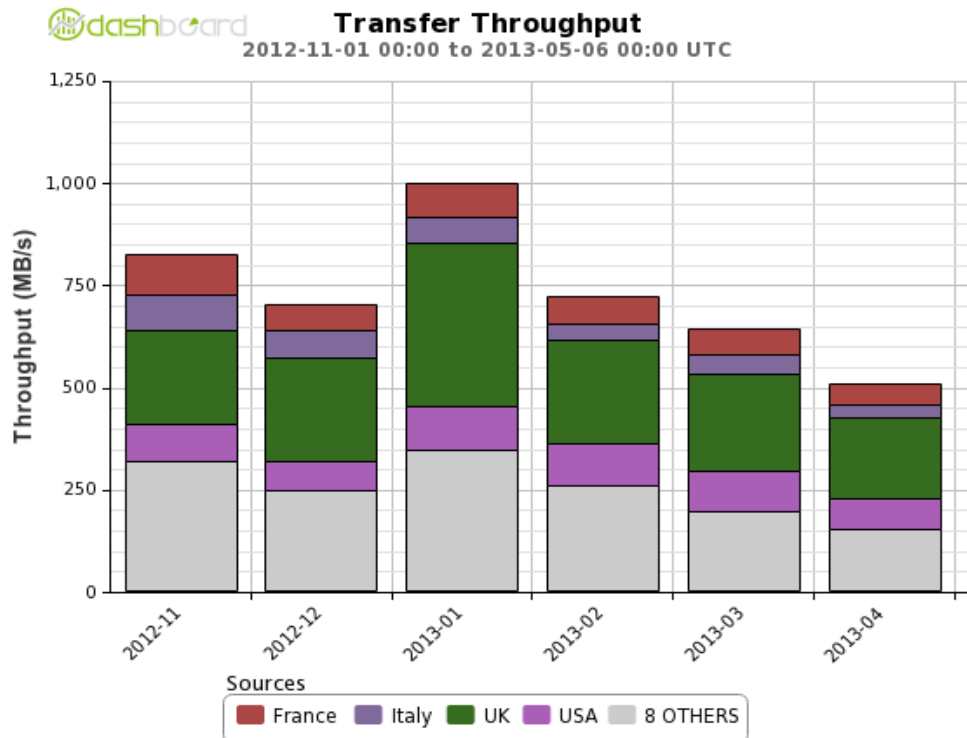


◆ Different activities compete for network resources



# Transfer activity to UK T2s

T1s → UK T2s



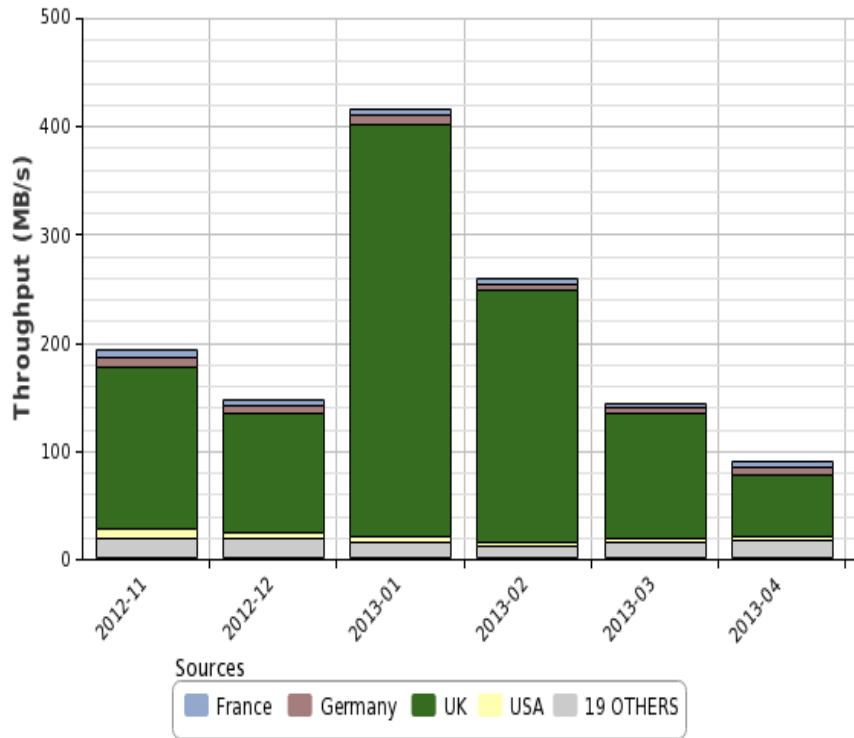
- ◆ Most of UK T2s well connected to all T1s
- ◆ ATLAS benefits from this flexibility



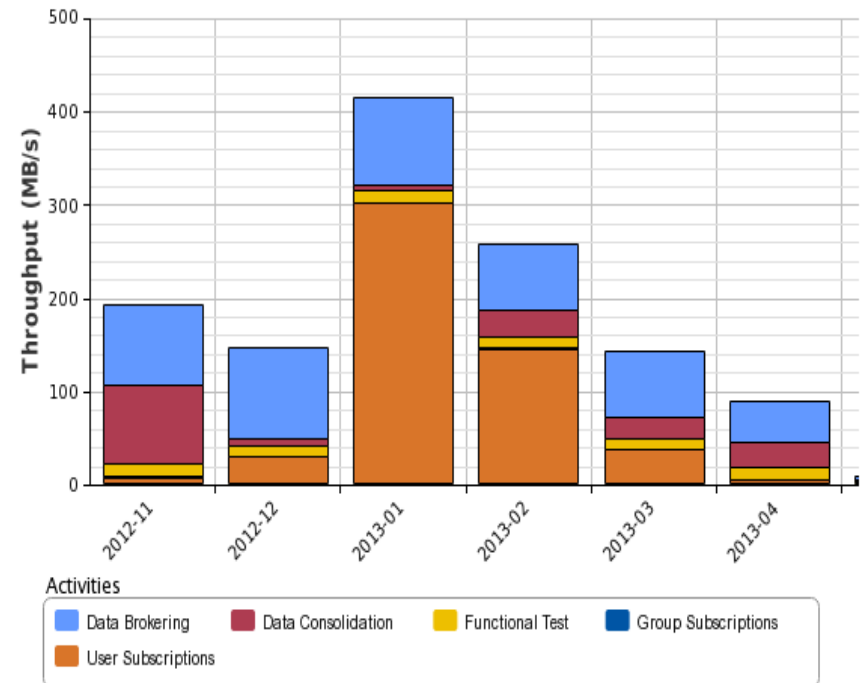
# Transfer activity to UK T2s

T2s → UK T2s

dashboard Transfer Throughput  
2012-11-01 00:00 to 2013-05-05 00:00 UTC



dashboard Transfer Throughput  
2012-11-01 00:00 to 2013-05-05 00:00 UTC



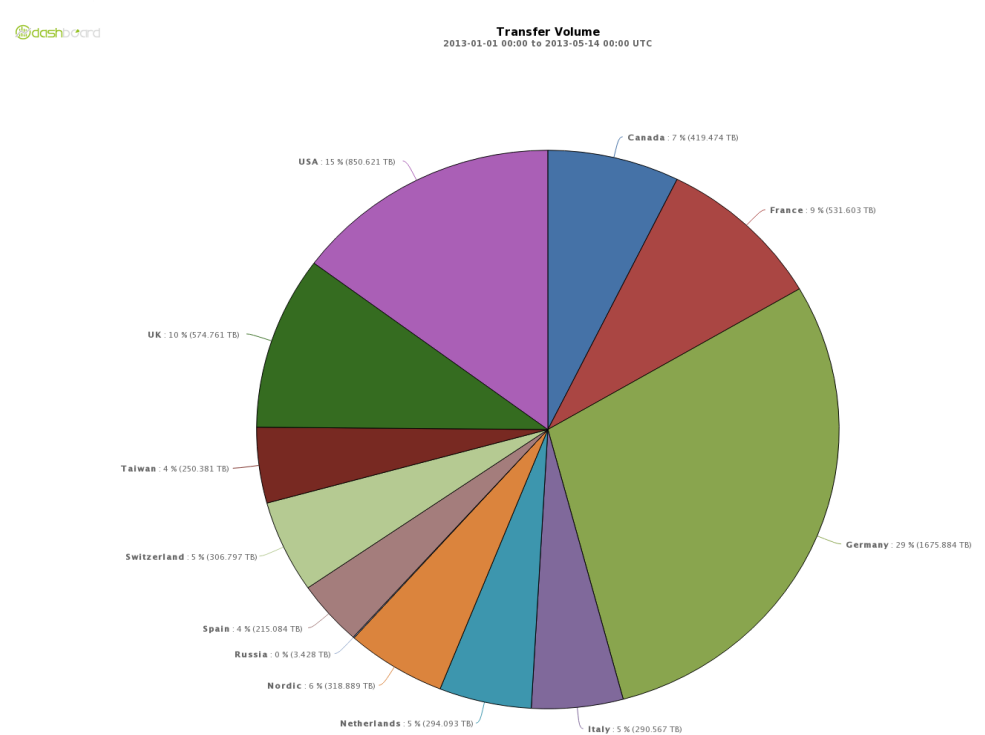
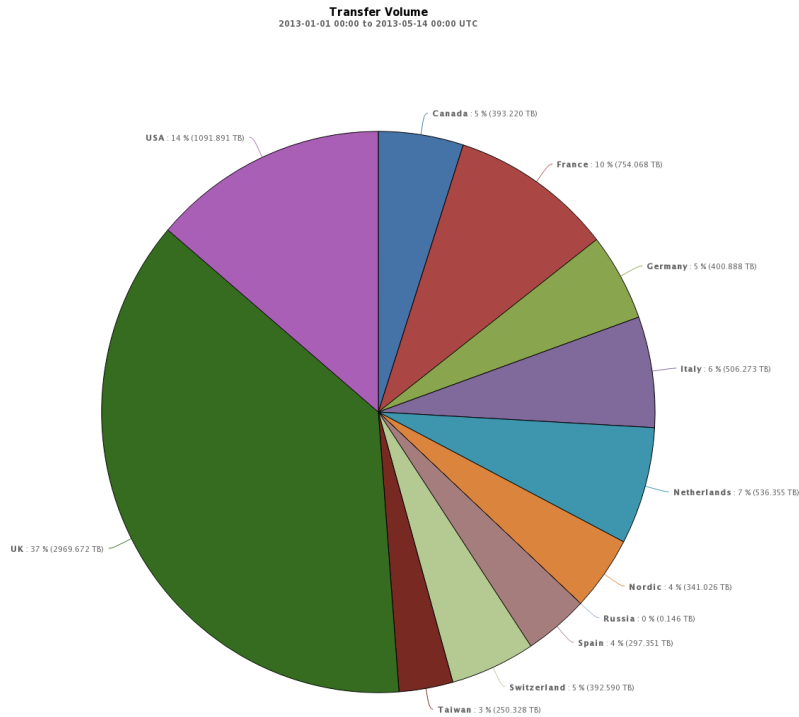
- ◆ Transfers within T2s critical within cloud/country
- ◆ Mostly used for user transfer



# Transfer activity to T2s

T1s → UK T2s

T1s → Germany T2s

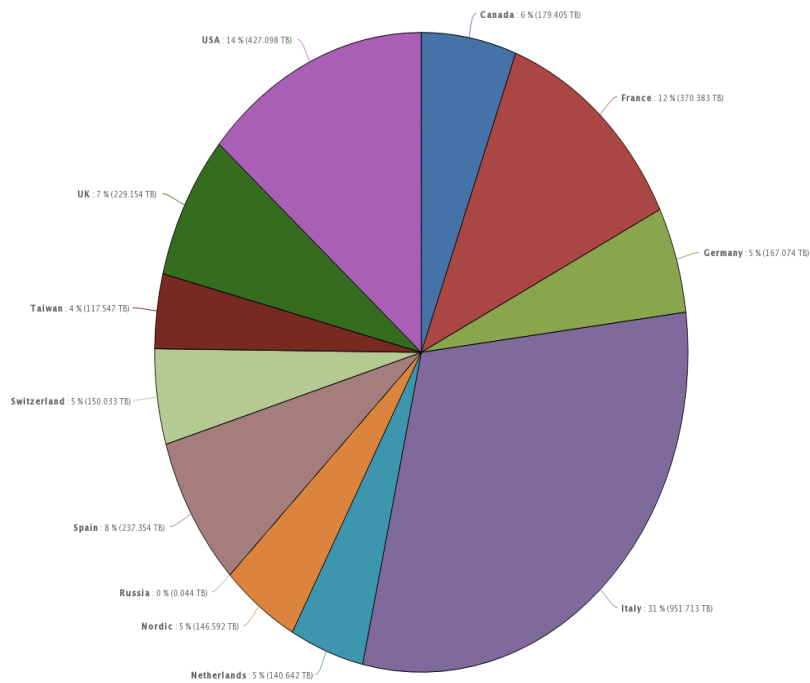




# Transfer activity to T2s (2)

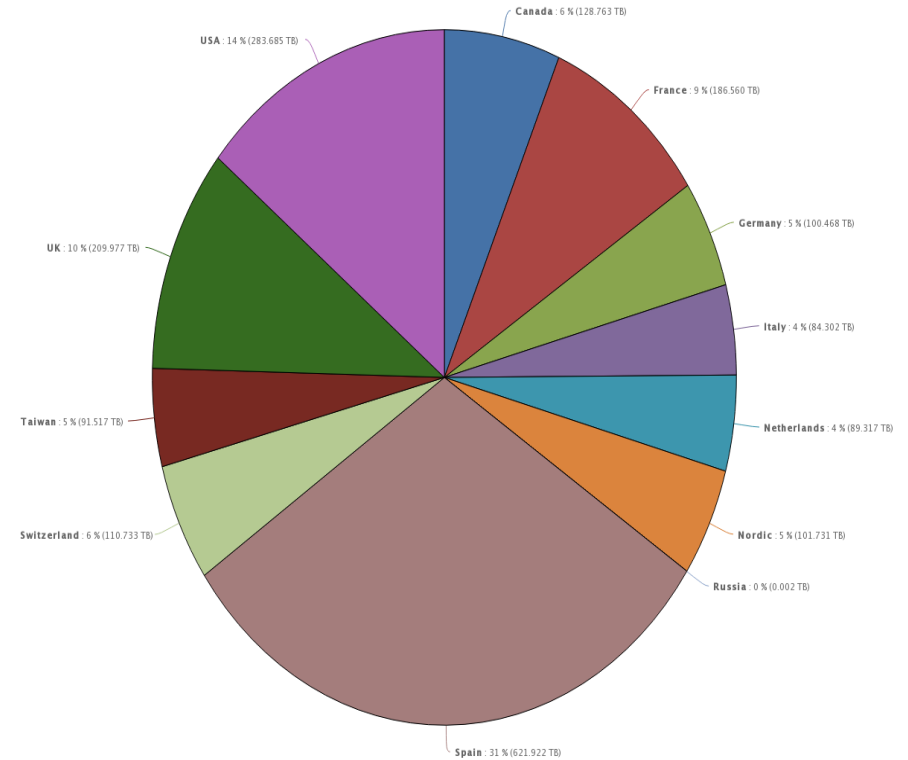
## T1s → Italy T2s

Transfer Volume  
2013-01-01 00:00 to 2013-05-14 00:00 UTC



## T1s → Spain T2s

Transfer Volume  
2013-01-01 00:00 to 2013-05-14 00:00 UTC





# Transfer activity to T2s (3)

T1s → USA T2s

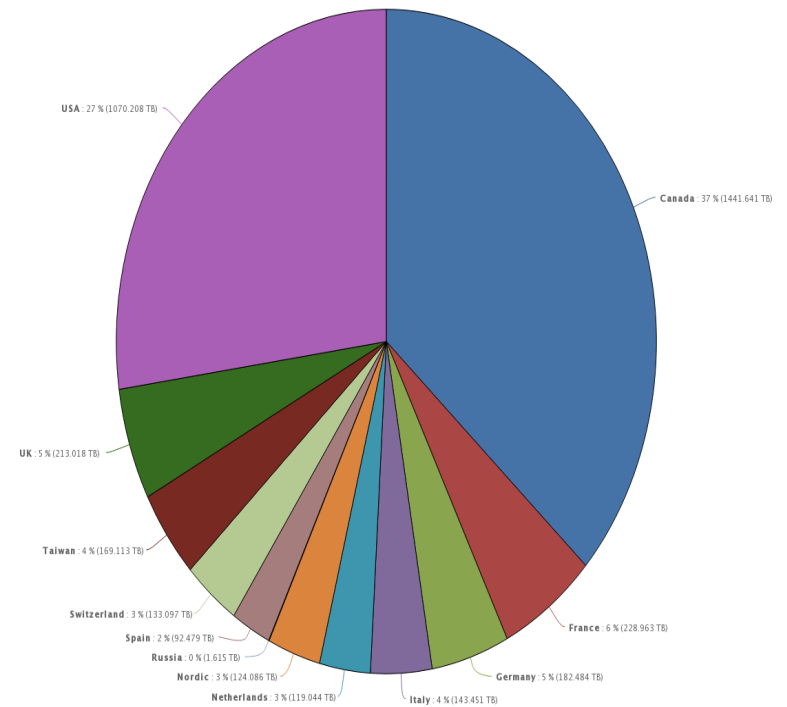
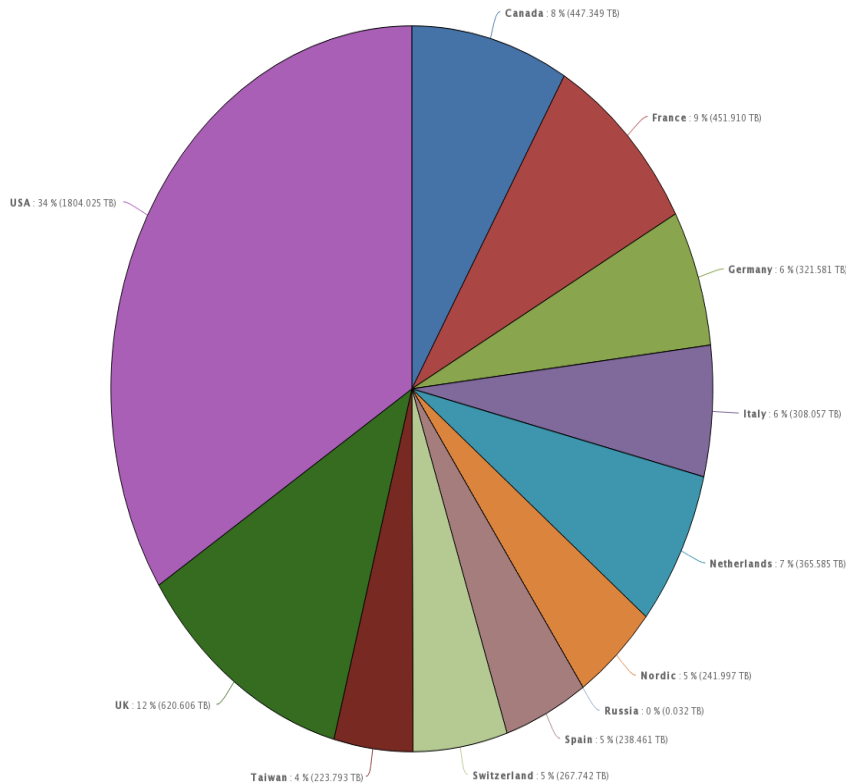
T1s → Canada T2s

@dashboard

Transfer Volume  
2013-01-01 00:00 to 2013-05-14 00:00 UTC

@dashboard

Transfer Volume  
2013-01-01 00:00 to 2013-05-14 00:00 UTC



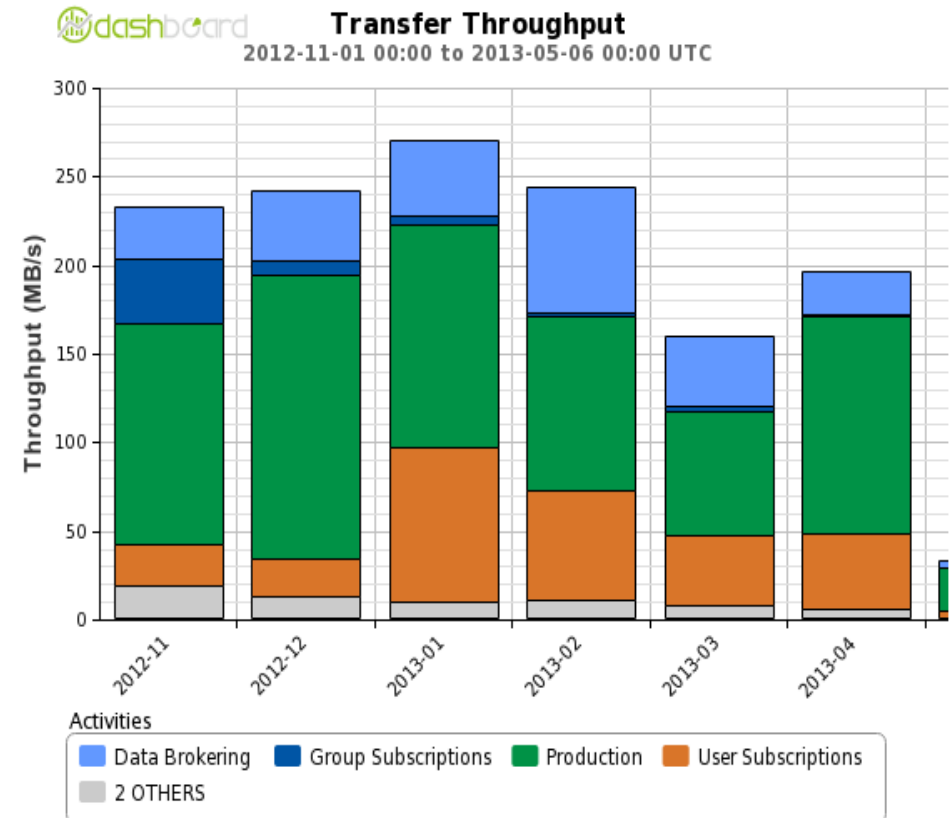
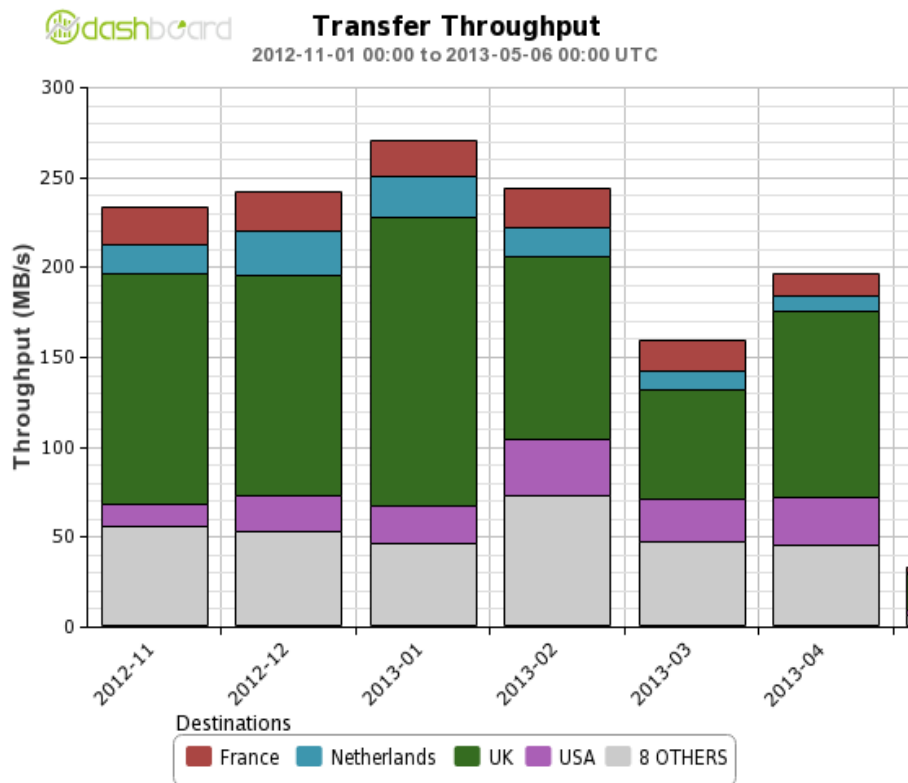
➔ Associated T1 traffic is 1/3 of T1s → T2





# Transfer activity from UK T2s

UK T2s → T1s

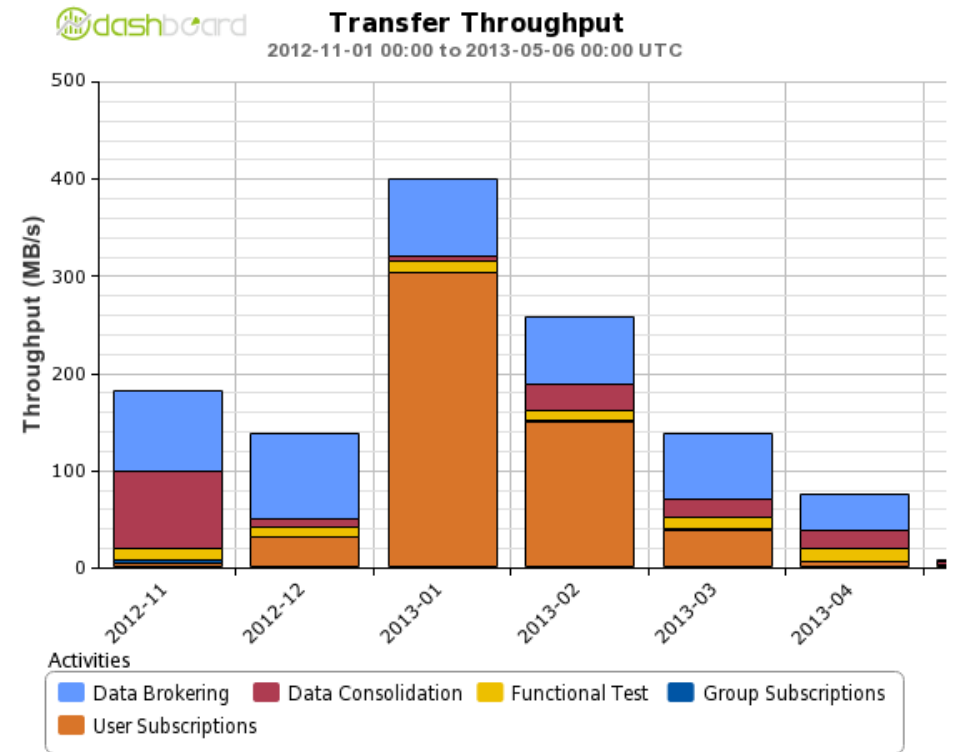
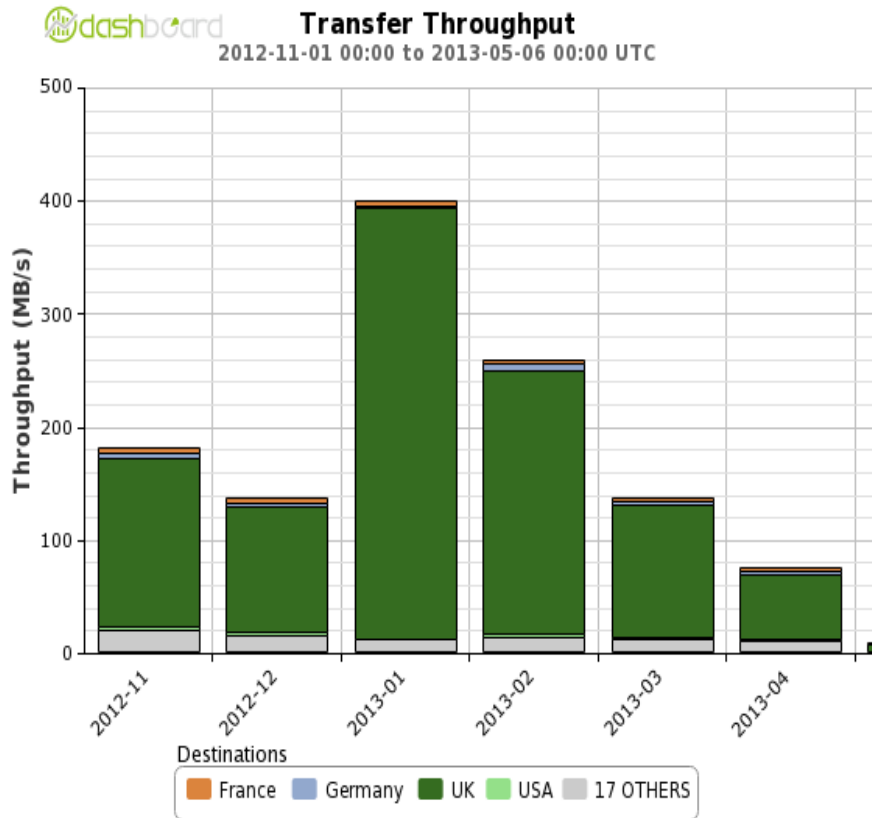


◆ Reduced compared to T1s → UK T2s (600 MB/s)



# Transfer activity from UK T2s

UK T2s → T2s



◆ Same as slide 13



- ▶ **Accessible worldwide :**

- ▶ [http://dashb-atlas-data.cern.ch/dashboard/ddm2/#tab=transfer\\_plots](http://dashb-atlas-data.cern.ch/dashboard/ddm2/#tab=transfer_plots)



- ▶ **Example of UK T2s demonstrated :**
  - ▶ **Good connectivity to all T1s is bonus for ATLAS**
  - ▶ **Reliable connectivity to associated T2s is necessary nowadays**
    - ▶ **Future ATLAS transfer tools (Rucio) plan to rely more on network connectivity than predefined associations**



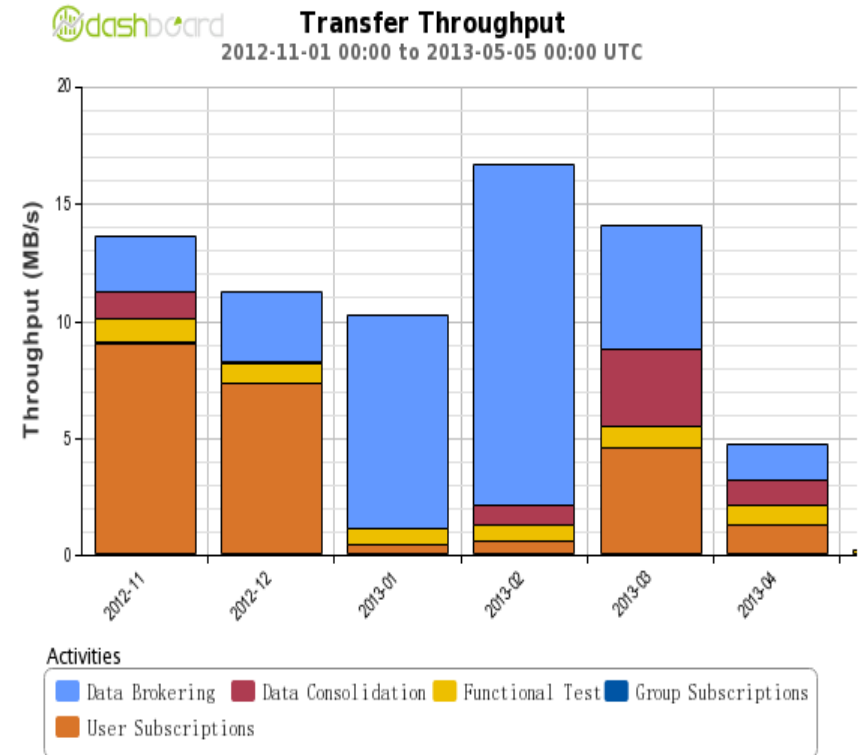
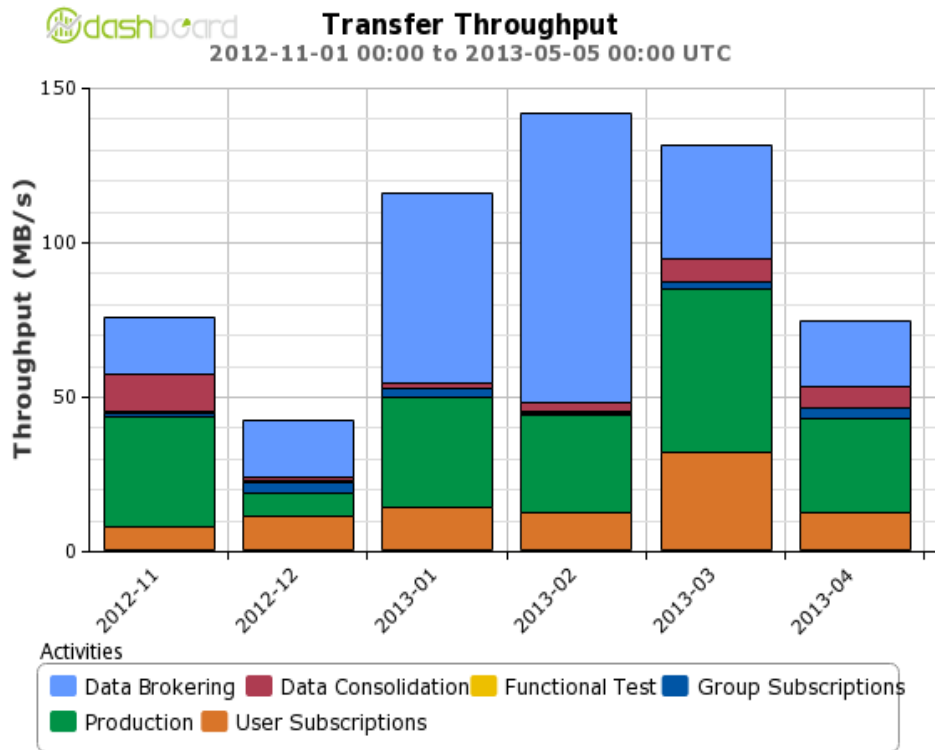
# Backup



# Transfer activity to JP T2

T1s → TOKYO T2

T2s → TOKYO T2





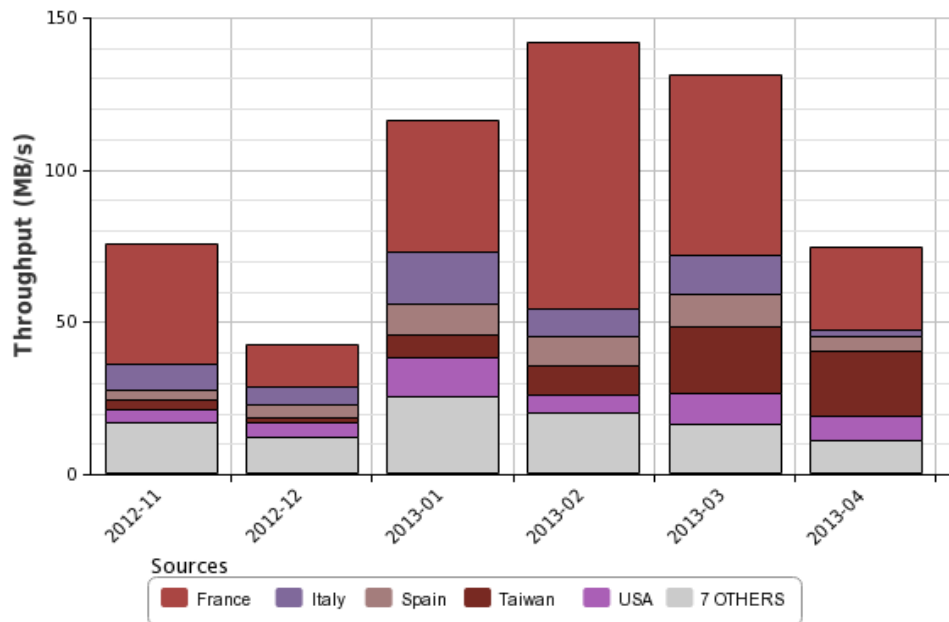
# Transfer activity to JP T2

T1s → TOKYO T2

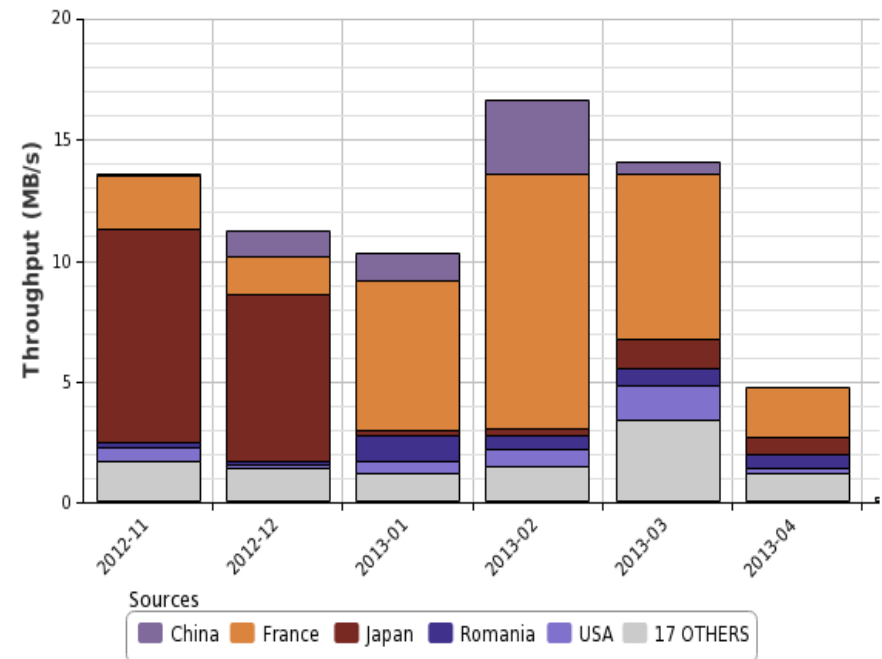
T2s → TOKYO T2



**Transfer Throughput**  
2012-11-01 00:00 to 2013-05-05 00:00 UTC



**Transfer Throughput**  
2012-11-01 00:00 to 2013-05-05 00:00 UTC





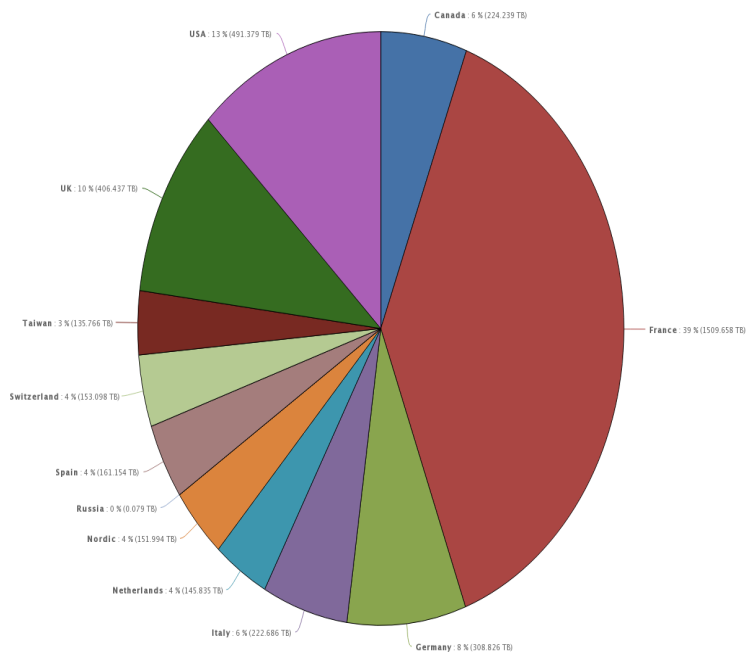
# Transfer activity to T2s (4)

T1s → French T2s

T1s → Tokyo T2s

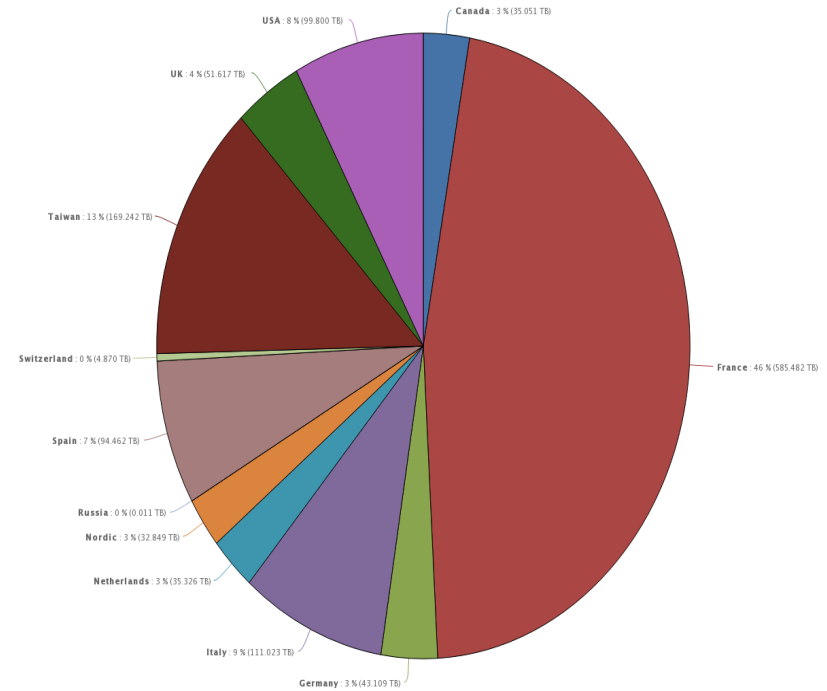
dashboard

Transfer Volume  
2013-01-01 00:00 to 2013-05-14 00:00 UTC



dashboard

Transfer Volume  
2013-01-01 00:00 to 2013-05-14 00:00 UTC



➤ Associated T1s → FR/JP higher than others

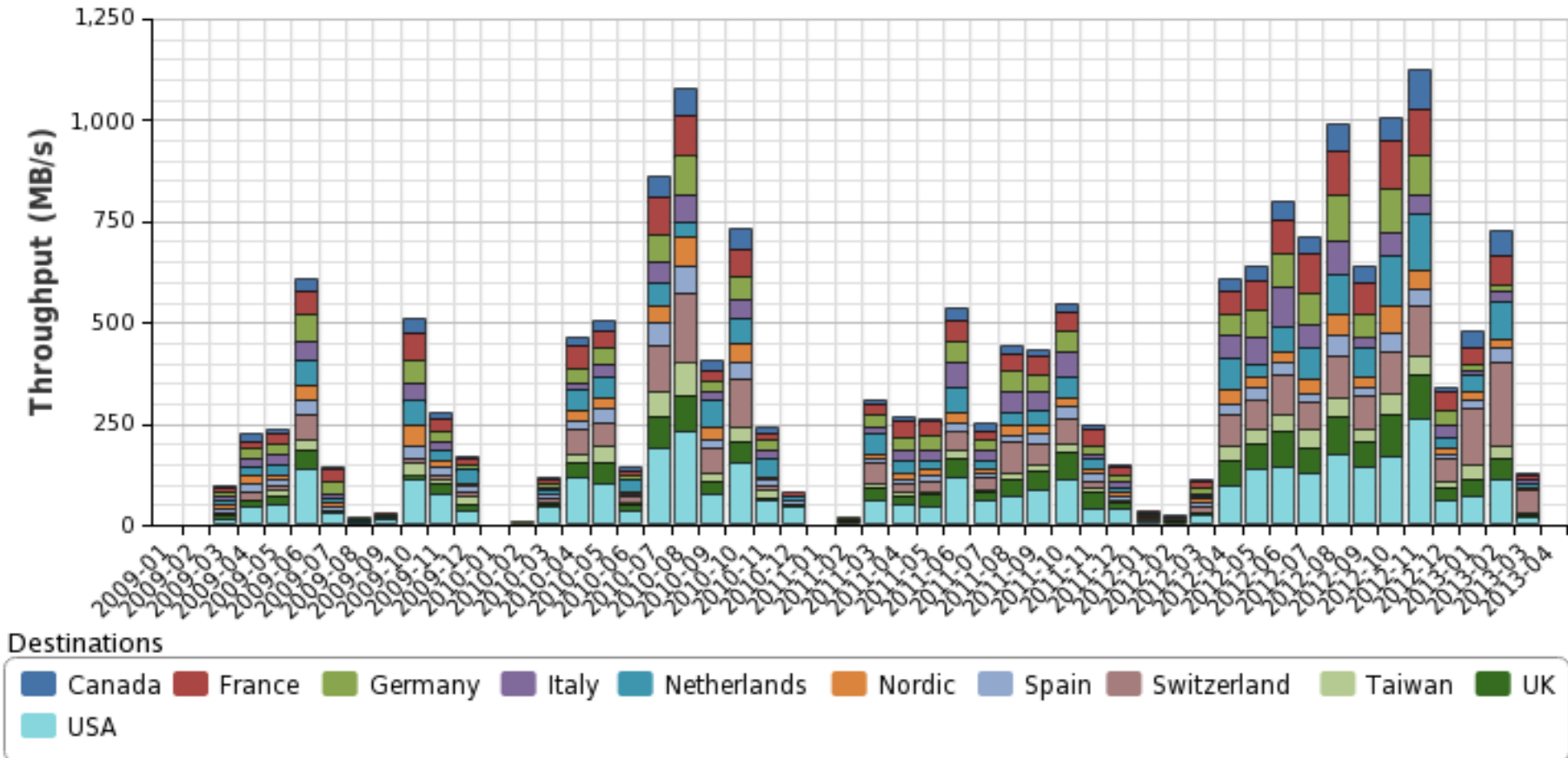




# T0 export activity



**Transfer Throughput**  
2008-12-28 00:00 to 2013-04-30 00:00 UTC



◆ Discussion of last march (when T1 short in disk space)

