

# An Optimal Multipath Assignment Technique for OpenFlow Network

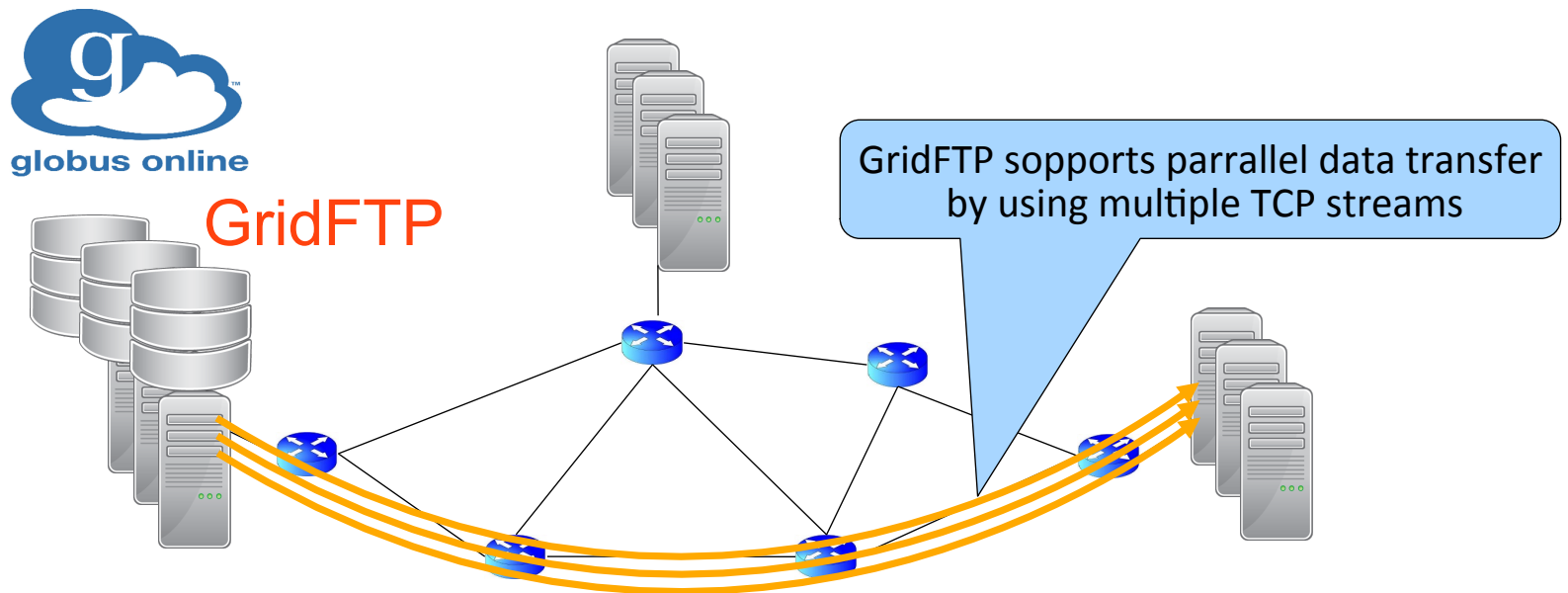
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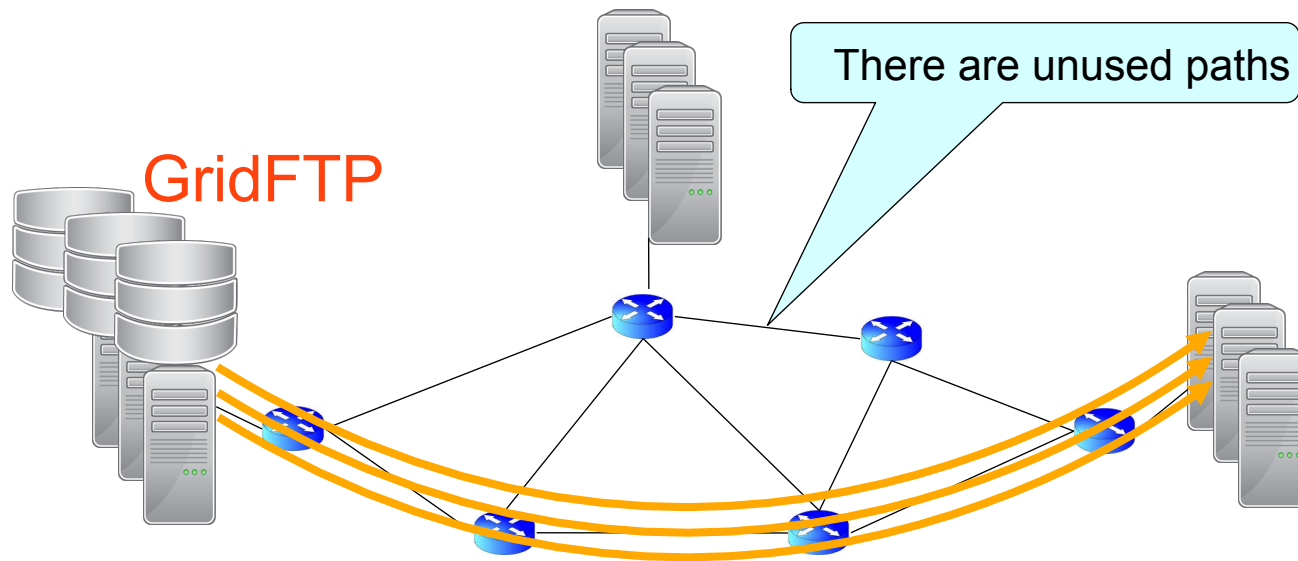
# Background

- The large scaleness of data utilisation in scientific research
  - A platform service for the high-speed large-scale data transfer between sites is necessary



# Problem

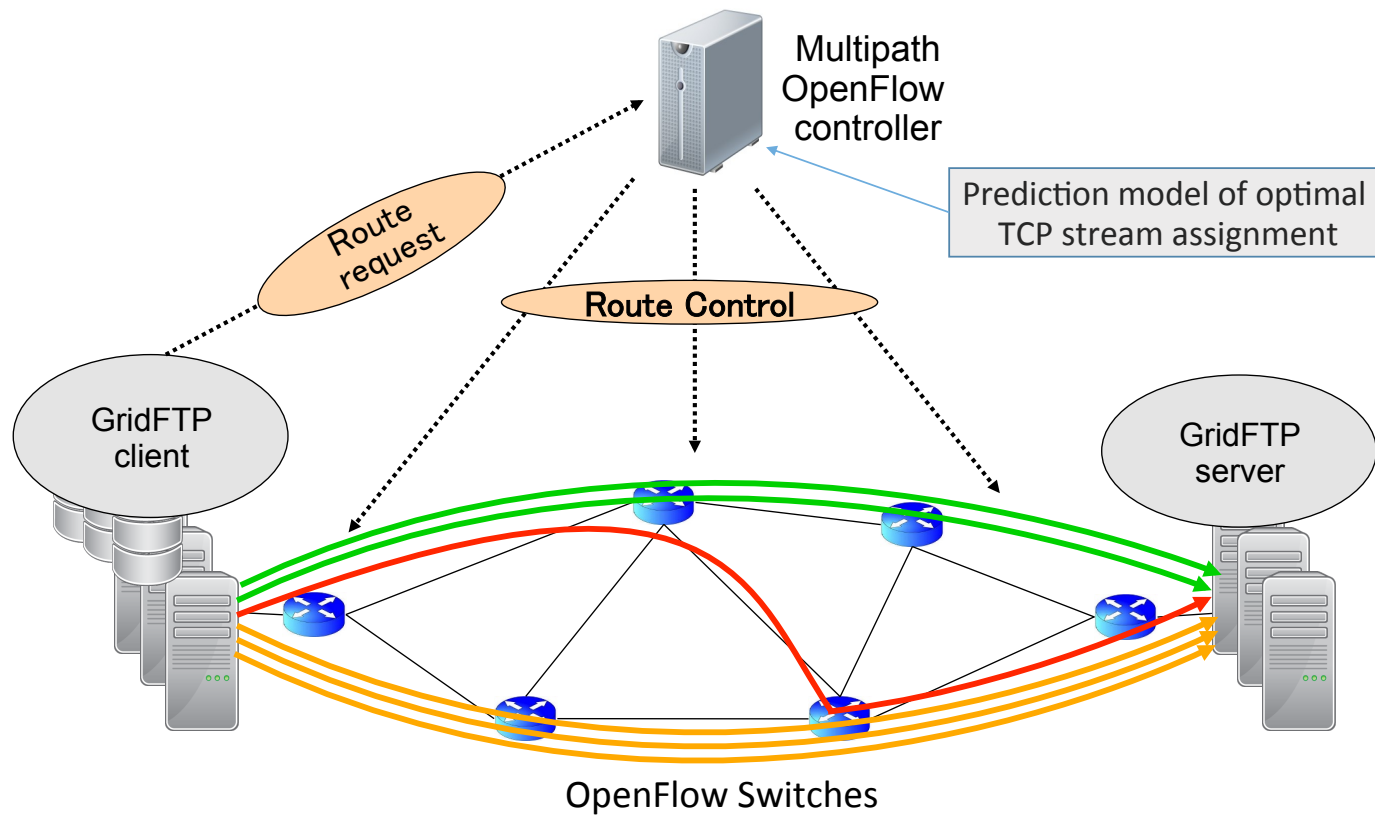
- GridFTP's high-speed transfer
  - Generally, only use the allocated route as per default IP routing



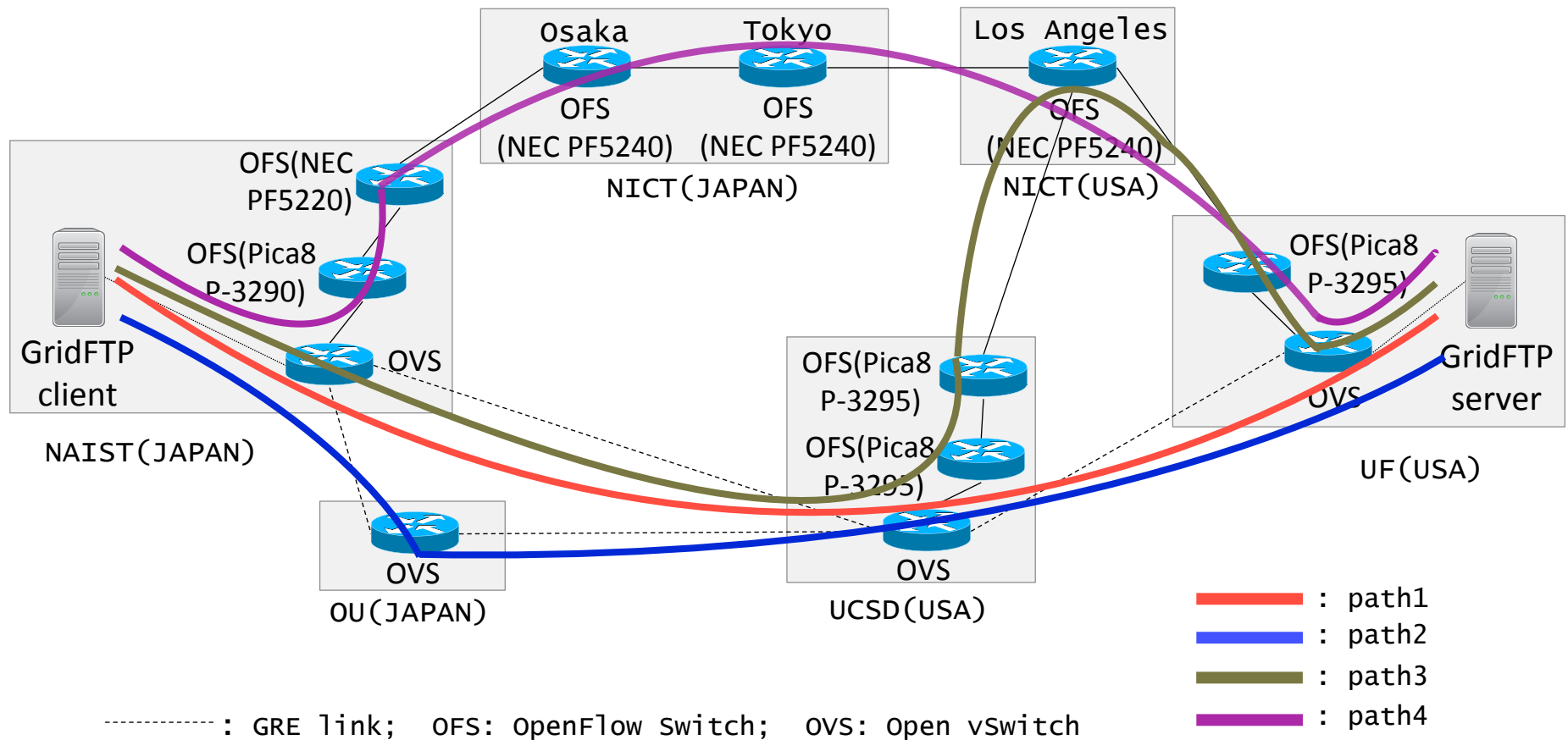
➔ Traffic engineering would allow GridFTP to use multiple paths improving its performance.

# Approach

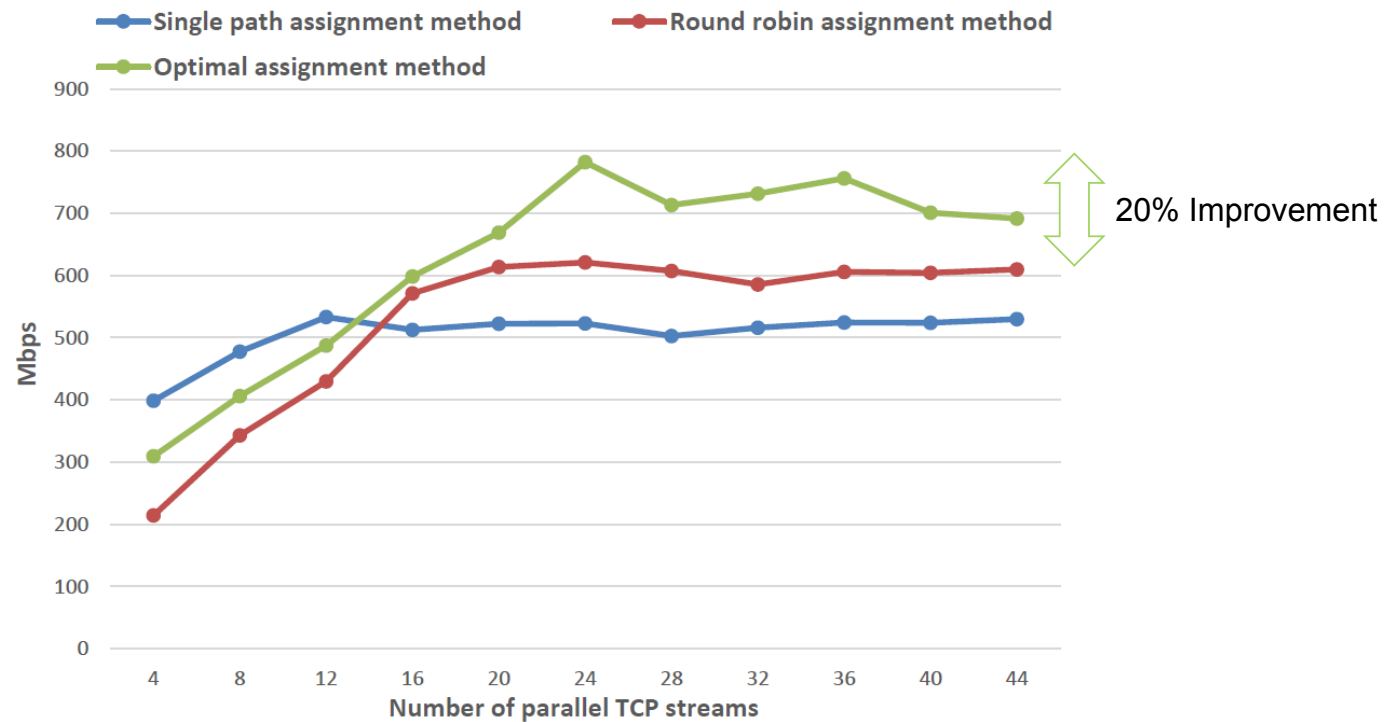
- Parallel GridFTP transfer using SDN



# Test on PRAGMA-ENT

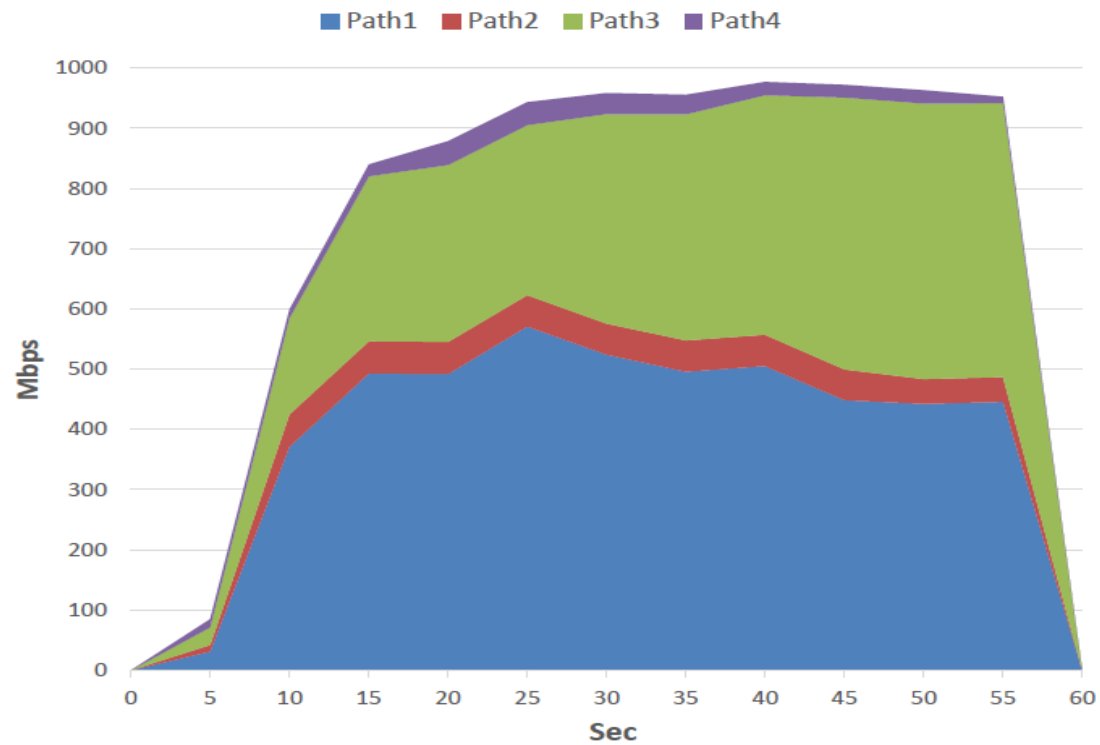


# Average Speed of Data Transfer



Result1: Comparison of the average data transfer speed between the single path assignment, the round robin assignment and the optimal assignment

# Used Bandwidth of Each Path



Result2: Used bandwidth for **optimal assignment method** in case of using 22 parallel TCP streams (TCP streams are assigned for each path with a ratio of 4:1:5:1 in order)

# Demo

```
IPTraf
+-----+-----+-----+-----+-----+-----+-----+
| Iface | Total | IPv4 | IPv6 | NonIP | BadIP | Activity |
+-----+-----+-----+-----+-----+-----+-----+
| lo     | 34     | 34    | 0     | 0      | 0      | 1.60 kbits/sec |
| eth0   | 549    | 549   | 0     | 0      | 0      | 28.40 kbits/sec |
| ofs01  | 0       | 0     | 0     | 0      | 0      | 0.00 kbits/sec  |
| tap0   | 32     | 32    | 0     | 0      | 0      | 1.20 kbits/sec  |
| br0    | 0       | 0     | 0     | 0      | 0      | 0.00 kbits/sec  |
| virbr0 | 0       | 0     | 0     | 0      | 0      | 0.00 kbits/sec  |
| gre2   | 0       | 0     | 0     | 0      | 0      | 0.00 kbits/sec  |
| gre3   | 32     | 32    | 0     | 0      | 0      | 1.20 kbits/sec  |
| gre4   | 0       | 0     | 0     | 0      | 0      | 0.00 kbits/sec  |
| gre5   | 0       | 0     | 0     | 0      | 0      | 0.00 kbits/sec  |
+-----+-----+-----+-----+-----+-----+-----+

Elapsed time: 0:00 Total, IP, NonIP, and BadIP are packet counts
Up/Down/PgUp/PgDn-scroll window X-exit

huangche@gridftp01 ~]$ time scp 2G_test.data root@10.1.1.6:/home/huangche/

Single path transfer

2] 0: bash" "huangche@gridftp01:~" 20:09 26-Jun-16
```