Routing Algorithms in NDN Networks

shahab SHARIAT BAGHERI

Luca MUSCARIELLO
Beatrice PESQUET
Pablo PIANTANIDA

Internship Defense
Salle F801, TELECOM ParisTech

Plan

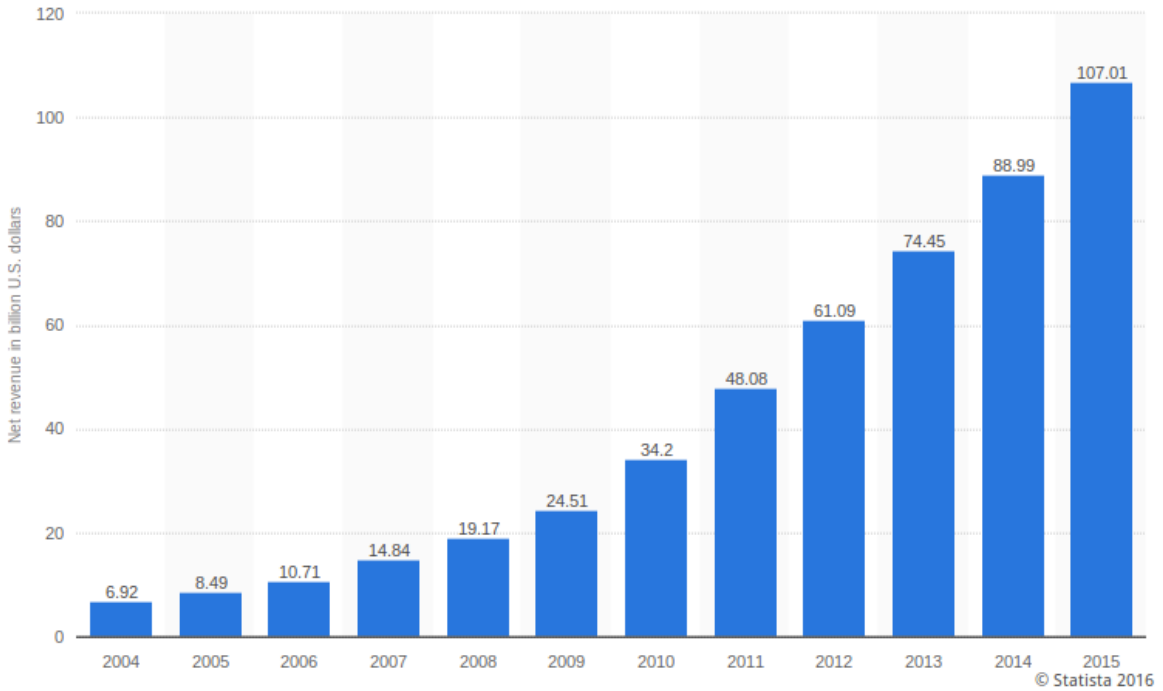
Plan

CISCO & PIRL

Cisco Systems France.

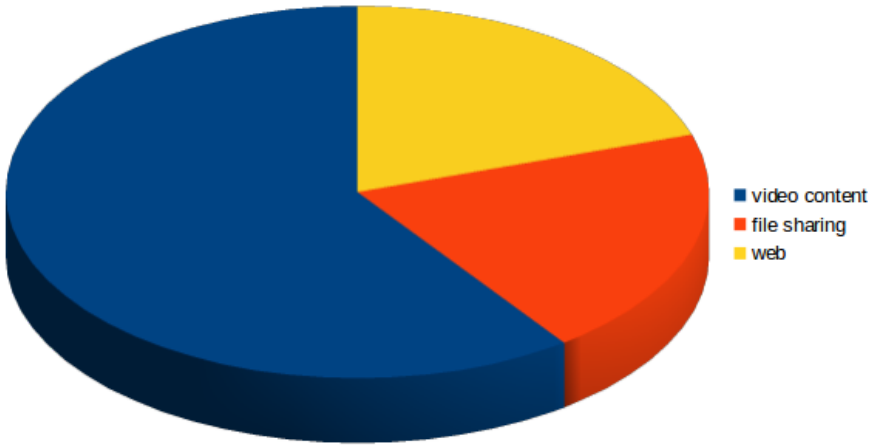
Goals and objectives

Net Revenu for Video Delivery Applications



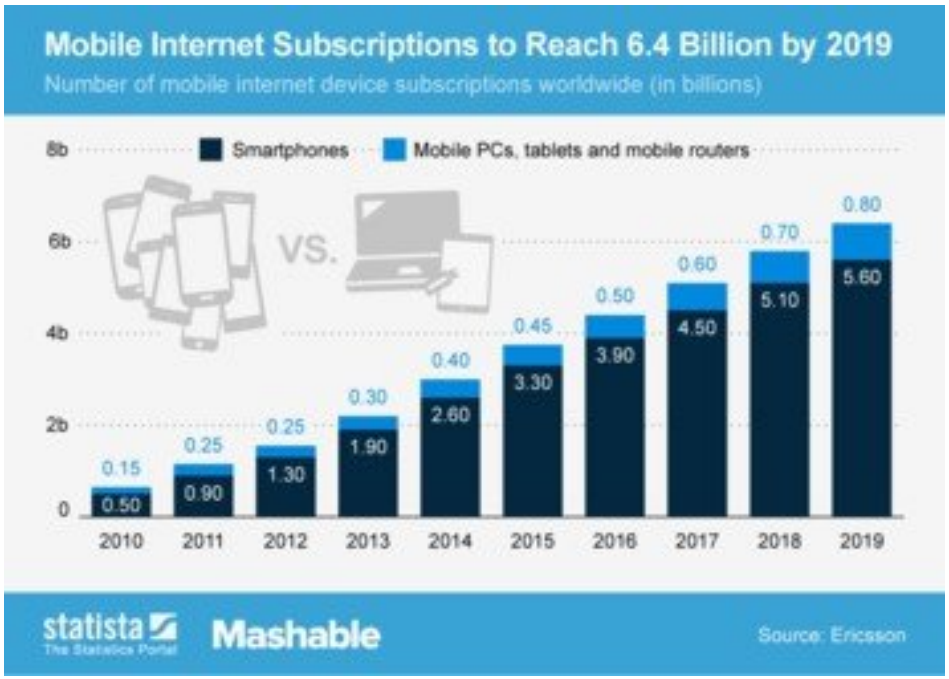
Goals and objectives

In 2016, More than 96 % of internet traffic is content.
Video $\longrightarrow$ 60%
File sharing $\longrightarrow$ 20%
Web $\longrightarrow$ 20%



Goals and objectives

Mobile vs PC Internet Traffic user $\longrightarrow$ 5G mobile networks



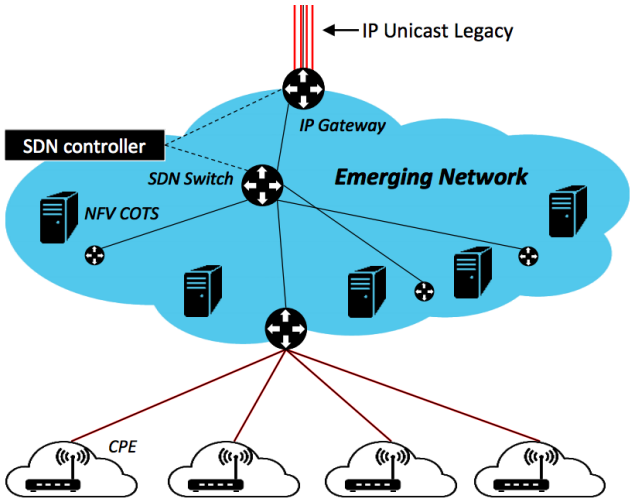
Plan

Named Data networking (NDN)

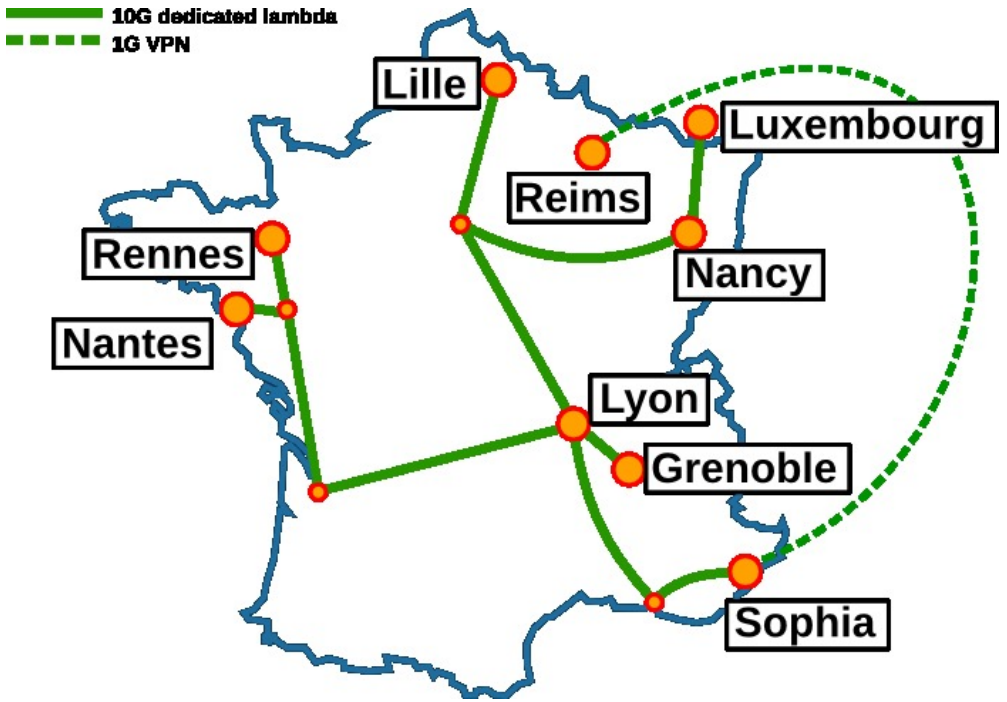
- **N**amed **D**ata **N**etworking ⇒ ***Name*** base Philosophy vs TCP/IP ***Calling*** Networking.
- V.Jacobson et al proposition, *Networking Named Content* 2009.
- A Good fit network desiging for Video Delivery Applications in **5G**.

Named Data networking (NDN)

- **Lurch** is an orchestrator originally developped for ccnx.
- We developped Lurch:
  - For NFD (NDN forwarder).
  - New Routing Strategies.
  - Different interfaces to interact with strategies at run time (Client, Repositories, forwading strategies, ...)

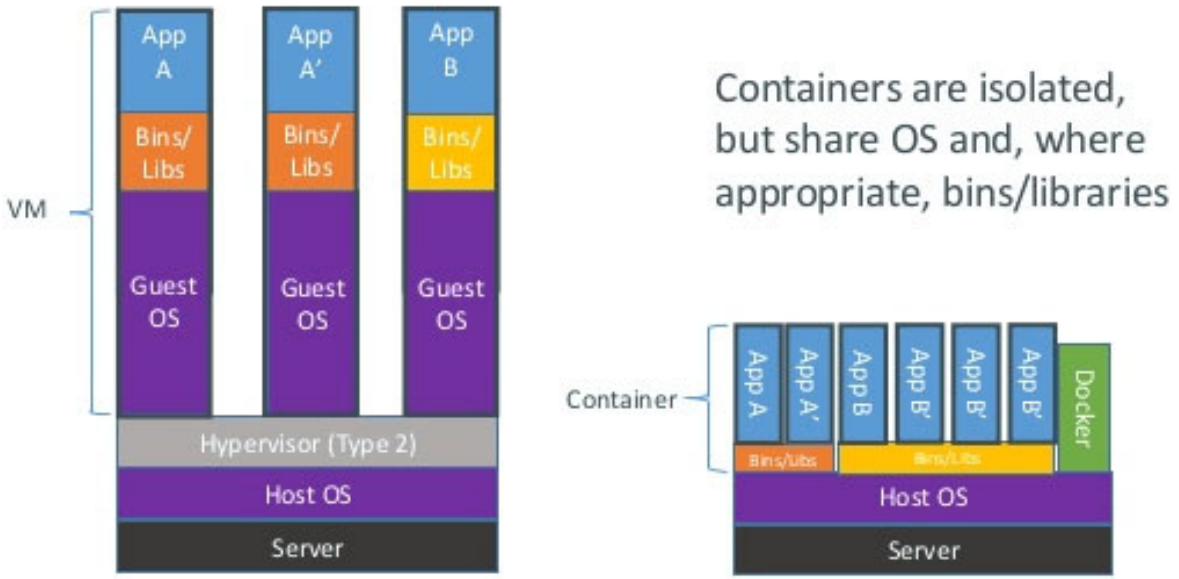


Named Data networking (NDN)



Virtualization and Linux Containers

Virtual Machines (VM) vs Linux Containers.



Routing Strategies

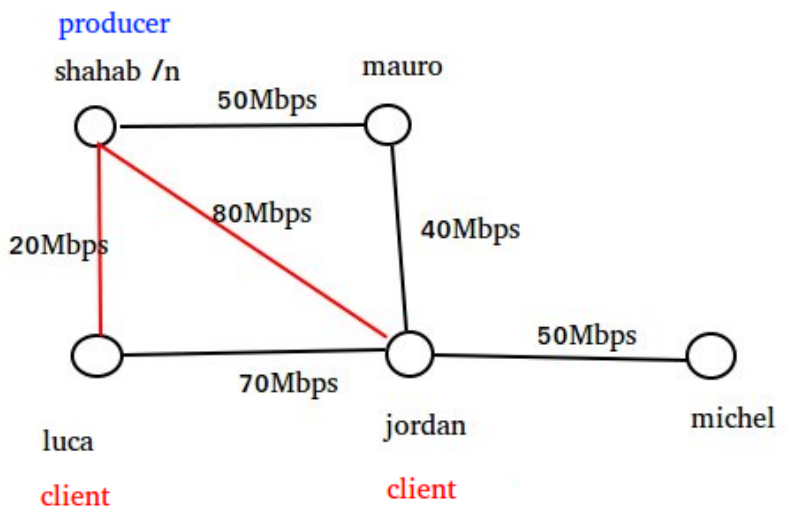
We proposed 4 different routing strategies for different situation of networks which can cover all of needs:

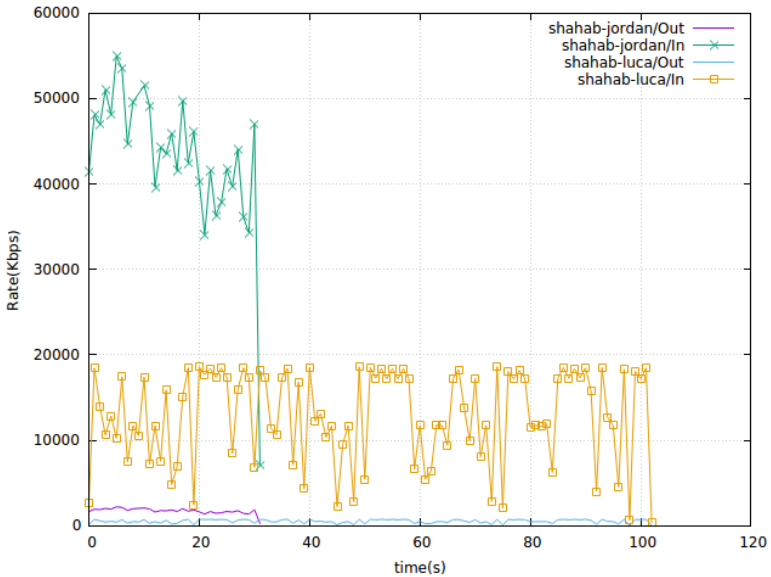
- **TreeOnConsumer** : N clients searching the same content from one repository detected by Lurch (Multicast mode).
- **TreeOnProducer**: One client who gets the packet from N Repositories of needed data.
- **MinCostMultiPath**: Using different paths with Equal Cost to retrieve the data using a proper forwarder strategy (load-balancing).
- **MaxFlow**: Allow to maximize the throughput using paths based on maximum flow algorithm between clients and repositories.

Plan

TreeOnConsumer

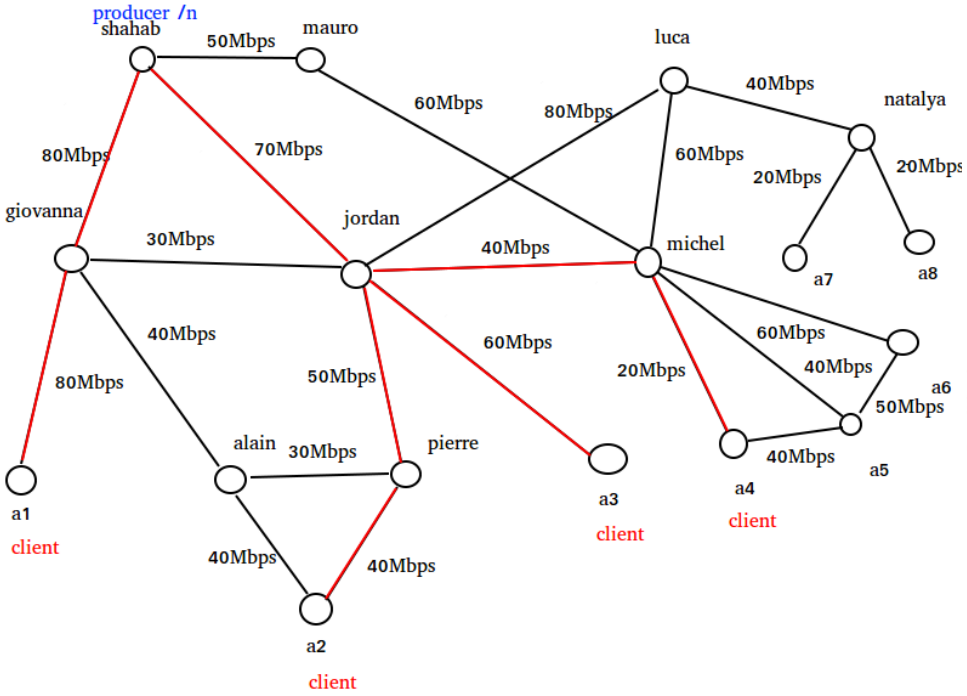
One producer to multiple consumer.

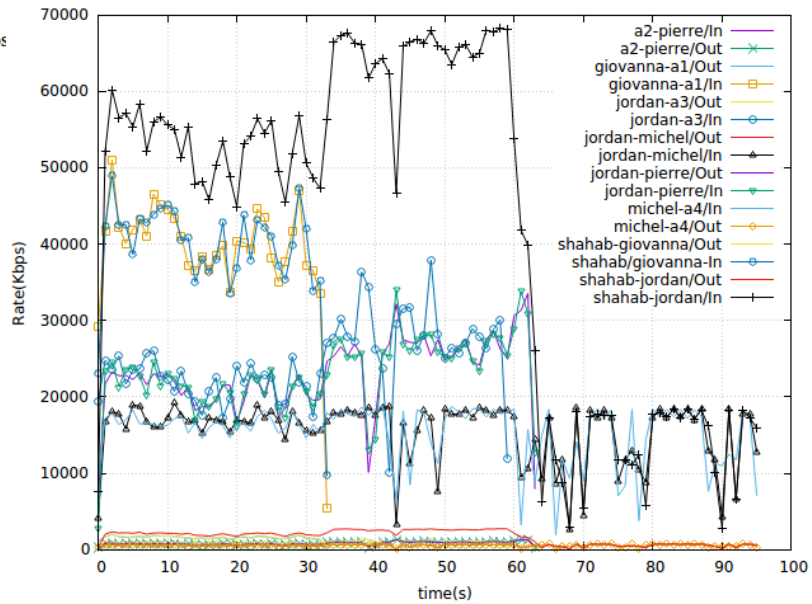




TreeOnConsumer

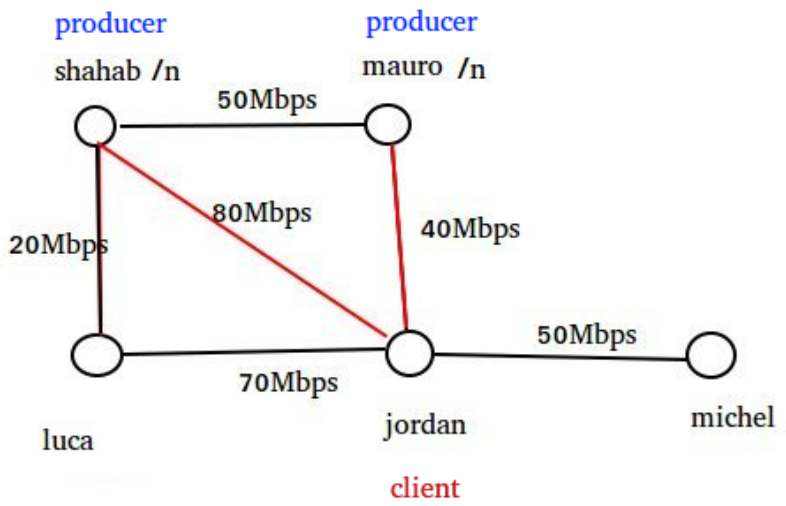
One producer to multiple consumer.

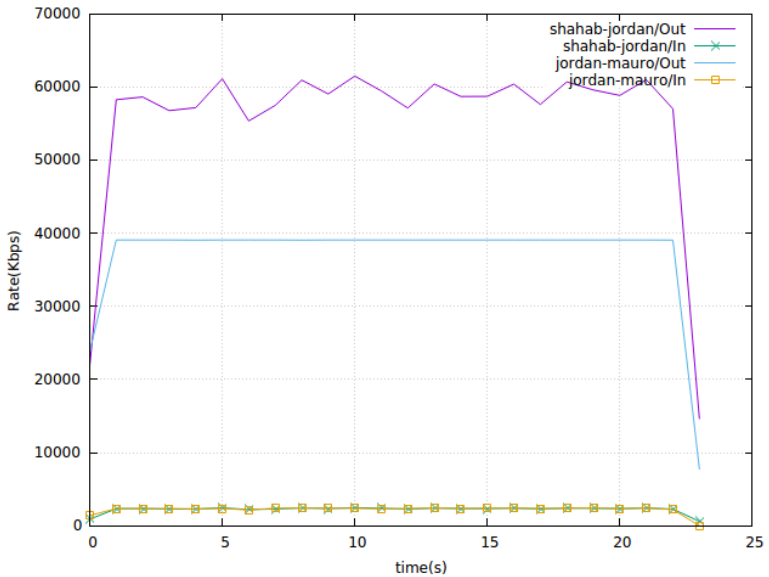




TreeOnProducer

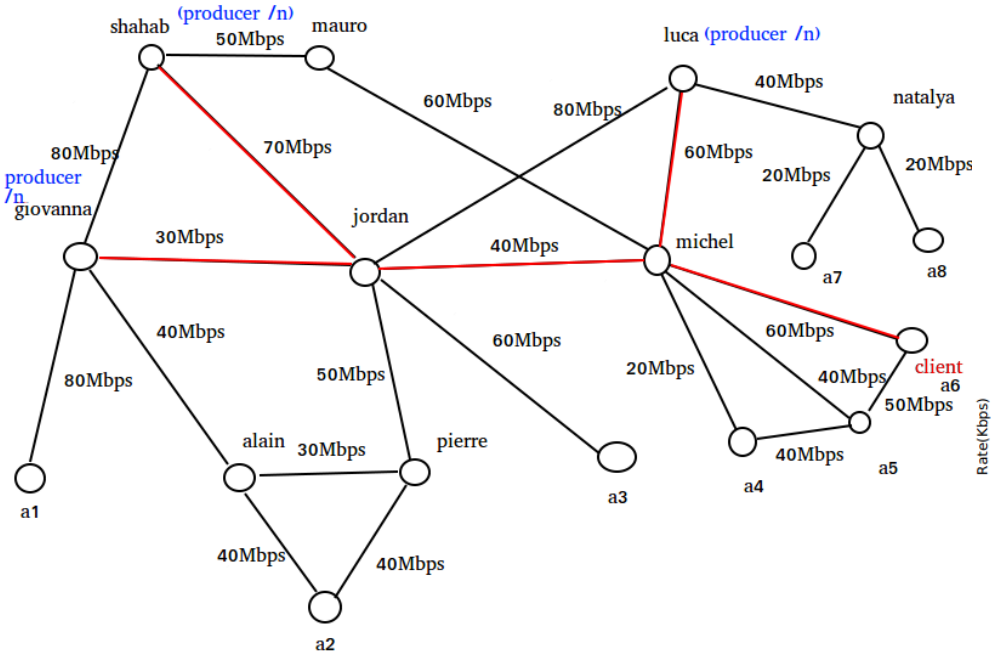
One Consumer to multiple producer.

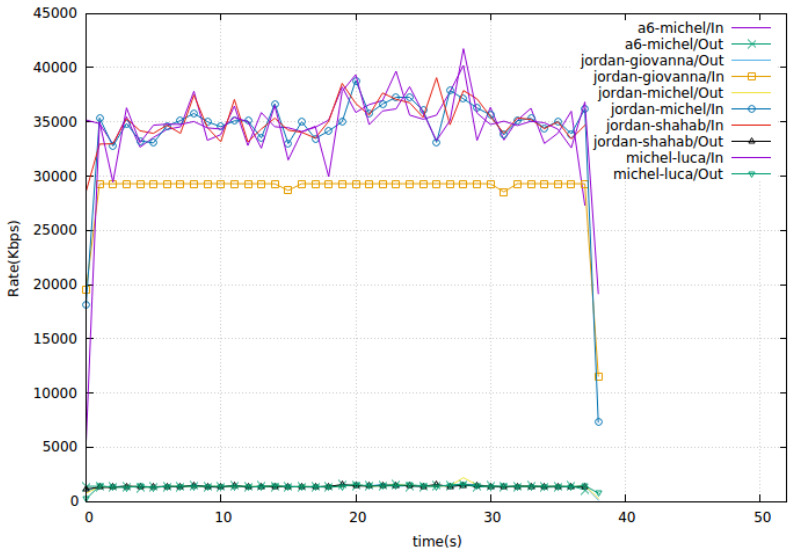




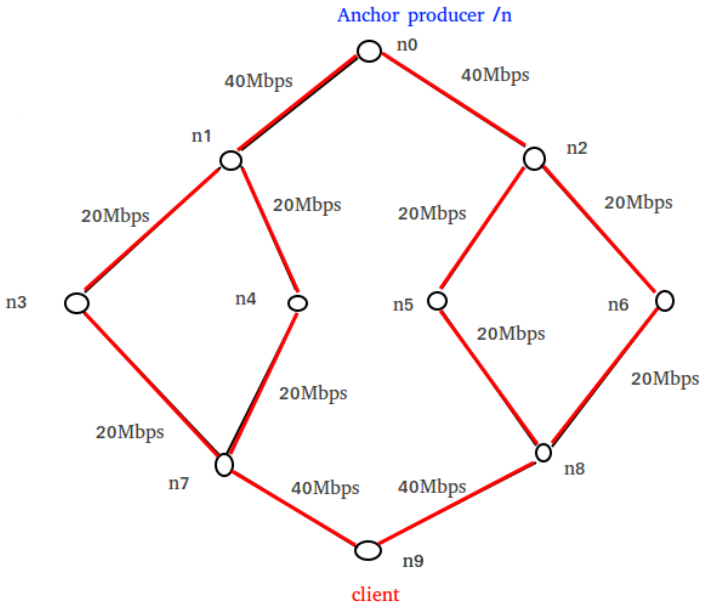
TreeOnProducer

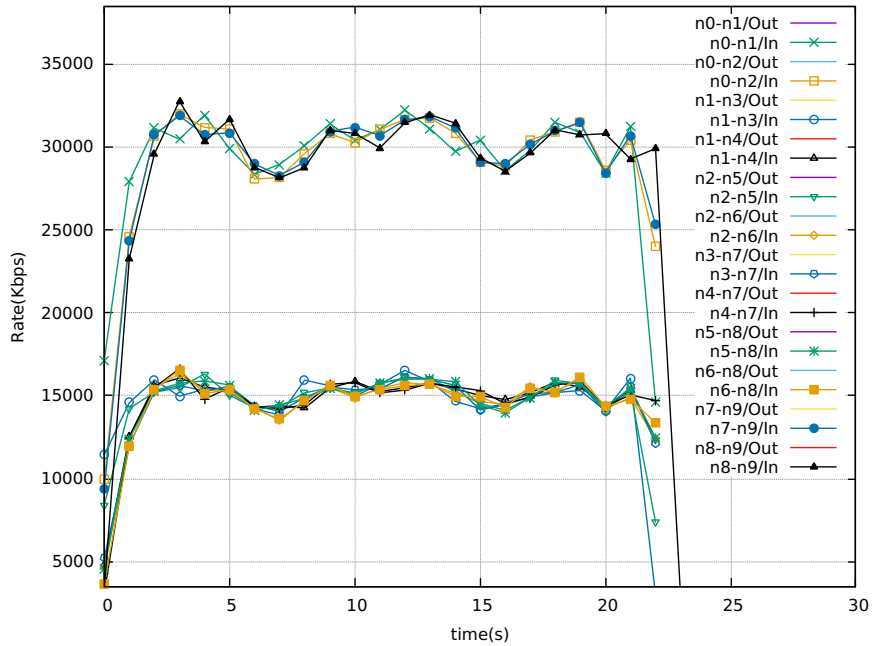
One Consumer to multiple producer.



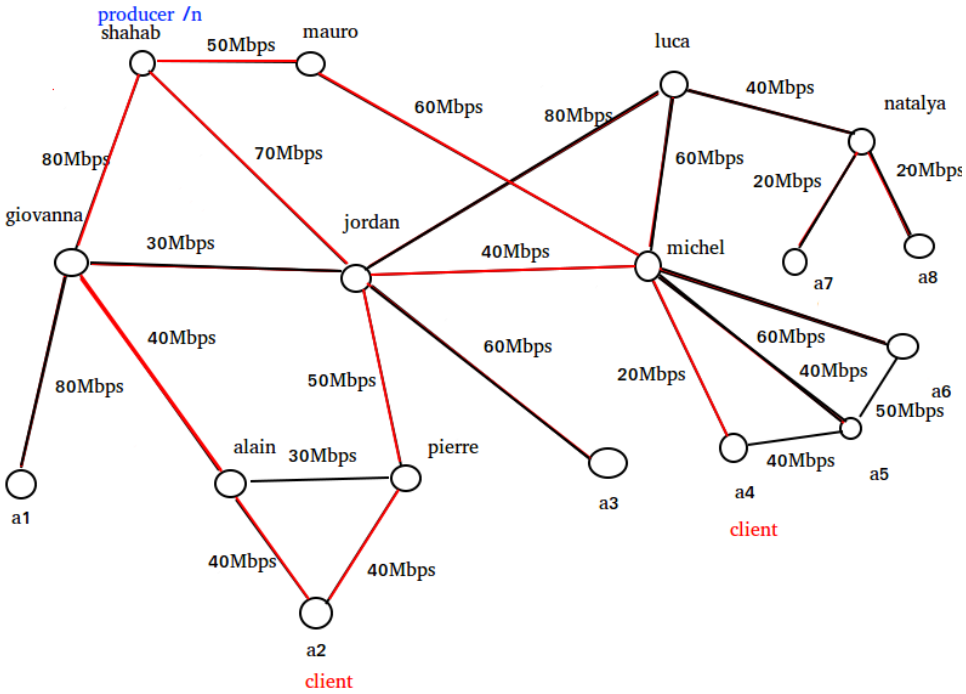


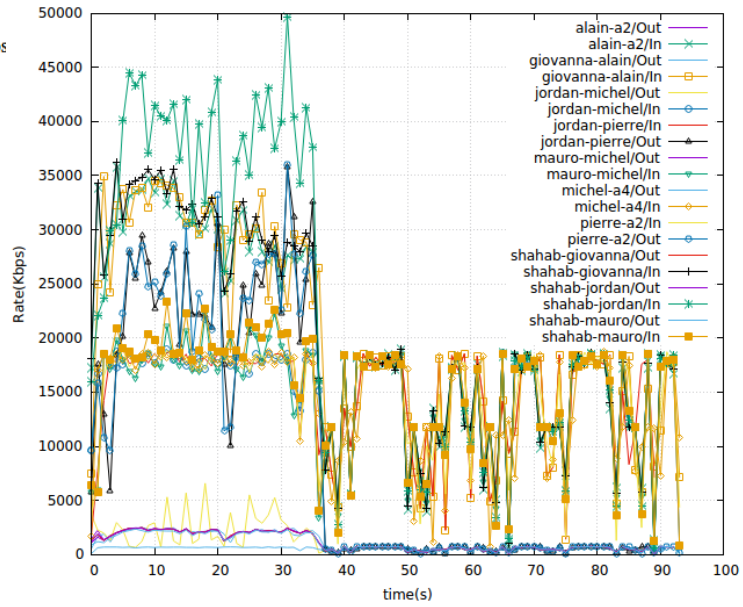
MinCostMultiPath





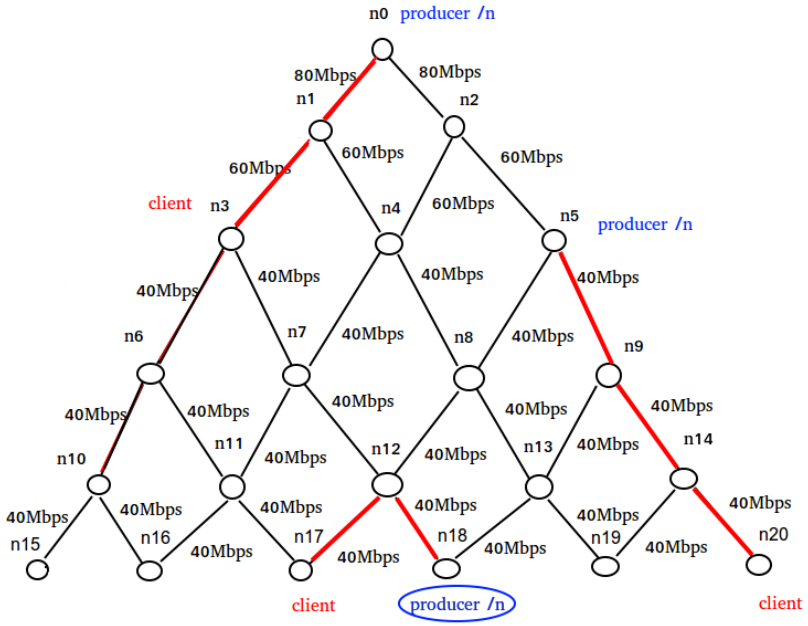
MinCostMultiPath

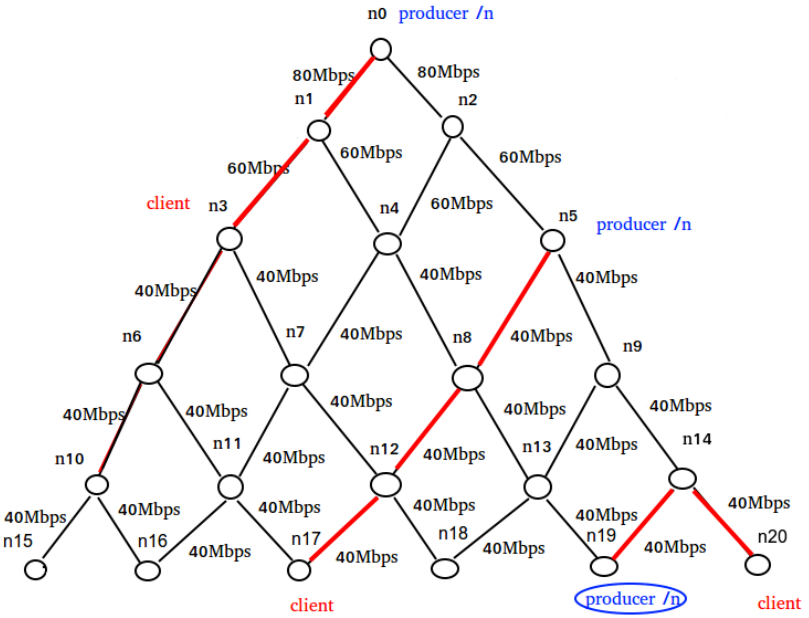




MinCostMultiPath

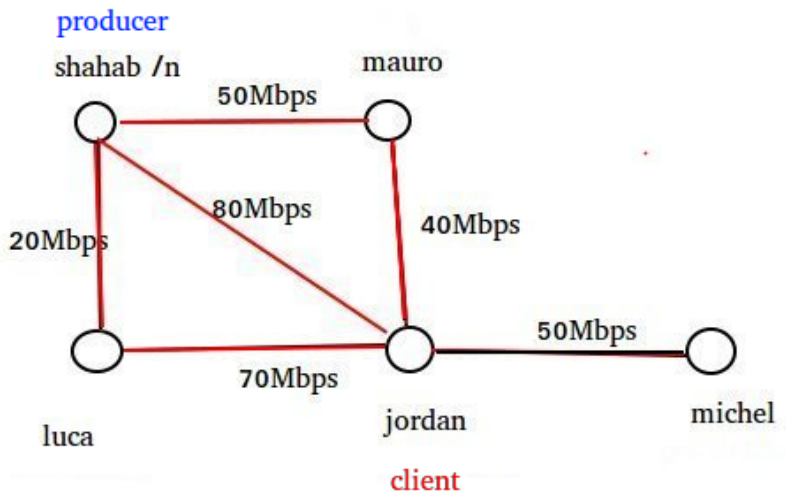
Producer Mobility with Routing update.

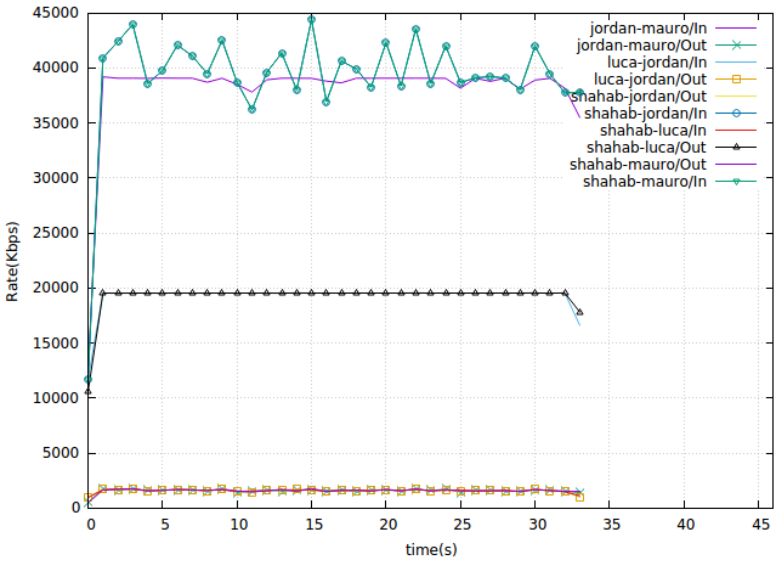




Maximum Flow

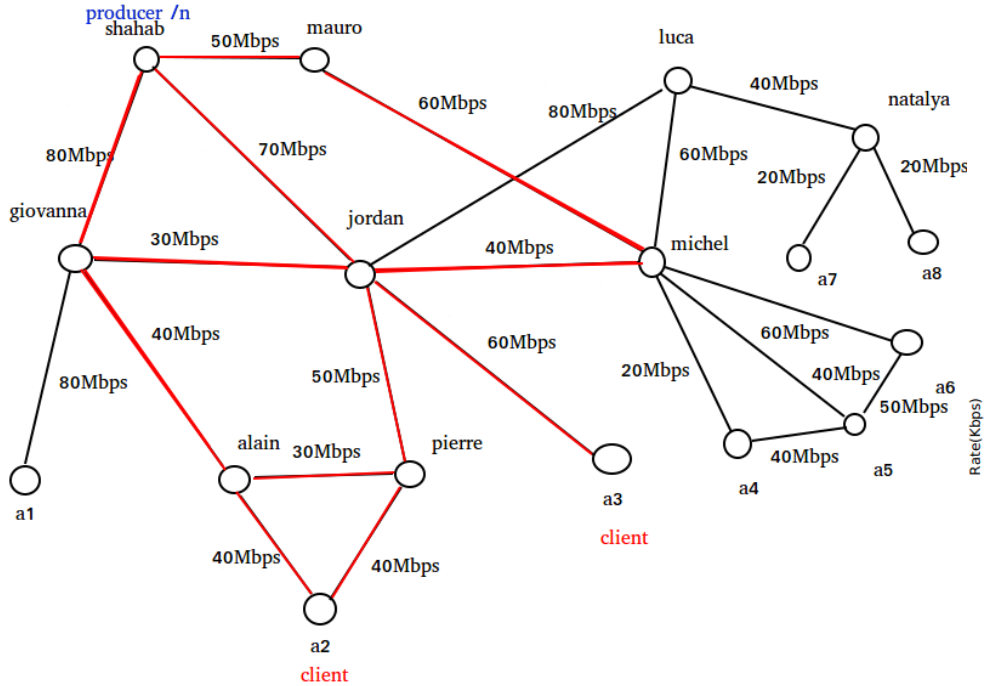
Maximum Flow algorithm chooses the path which maximizes through from consumer to producer.

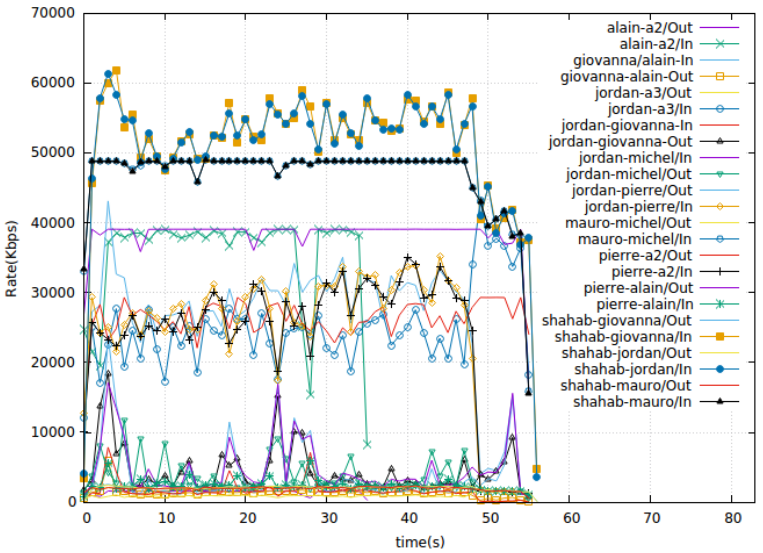




Maximum Flow

Maximum Flow algorithm chooses the path which maximizes through from consumer to producer.





Plan

Conclusion

- There is always some limitations in practical against pure theoritical works which can be seen when you work experimental..
- ICN is one of the most challenging domain who has a lot of passion in research and development.
- Software Define Networking is beautiful idea which allows to interact with your network on data centers and to shift heavy calculations.
- Coding is one of way that you can realize your system.


MERCI