Routing Algorithms in NDN Networks

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Internship Defense
Salle F801, TELECOM ParisTech
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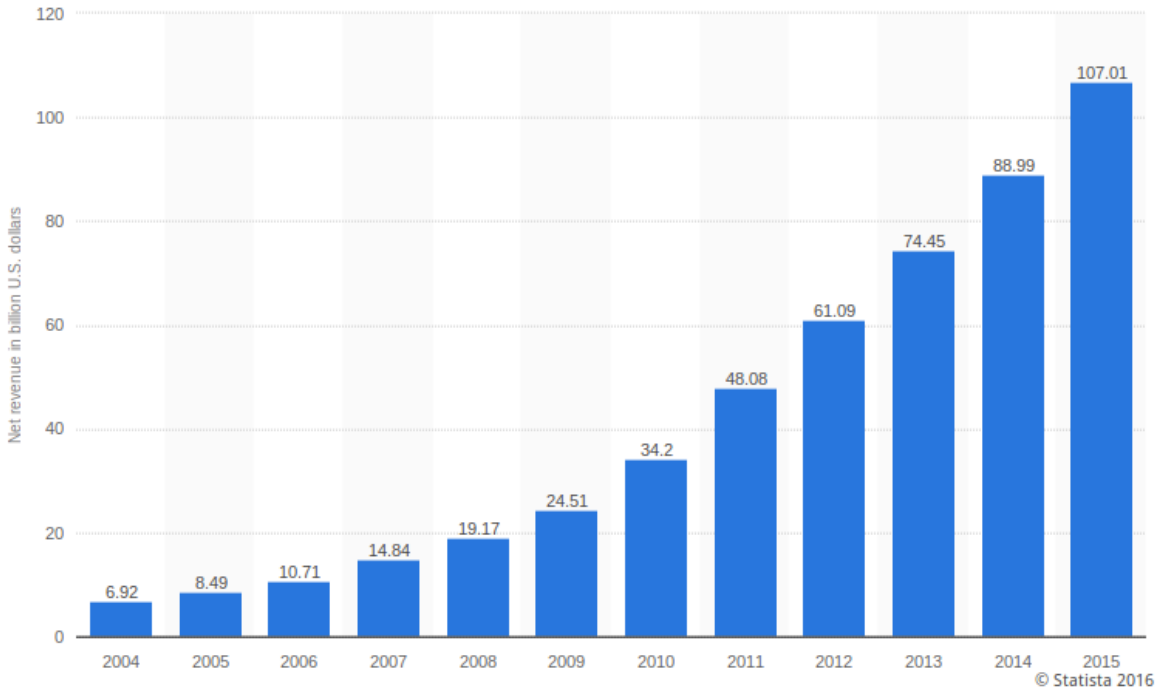
Plan

Plan

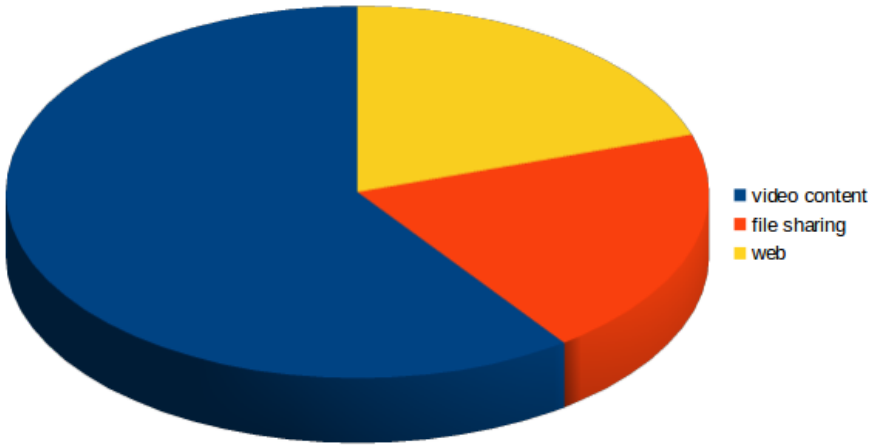
Goals and objectives

Net Revenu for Video Delivery Applications in USA



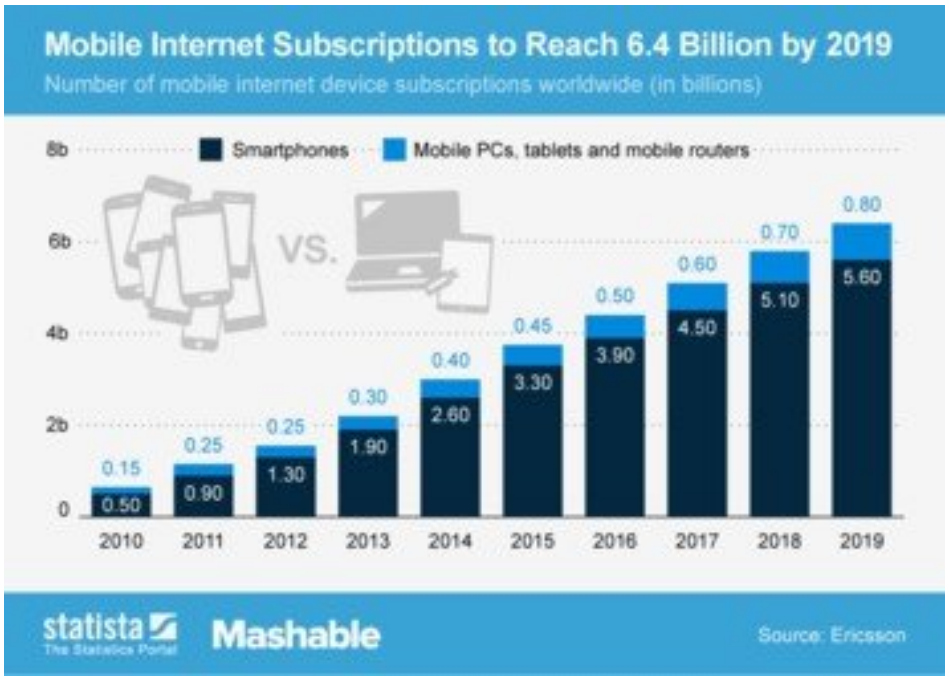
Goals and objectives

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



CISCO & PIRL

Cisco Systems France.

Plan

Named Data networking (NDN)

Why ICN?

- **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 designing for Video Delivery Applications in **5G**.

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

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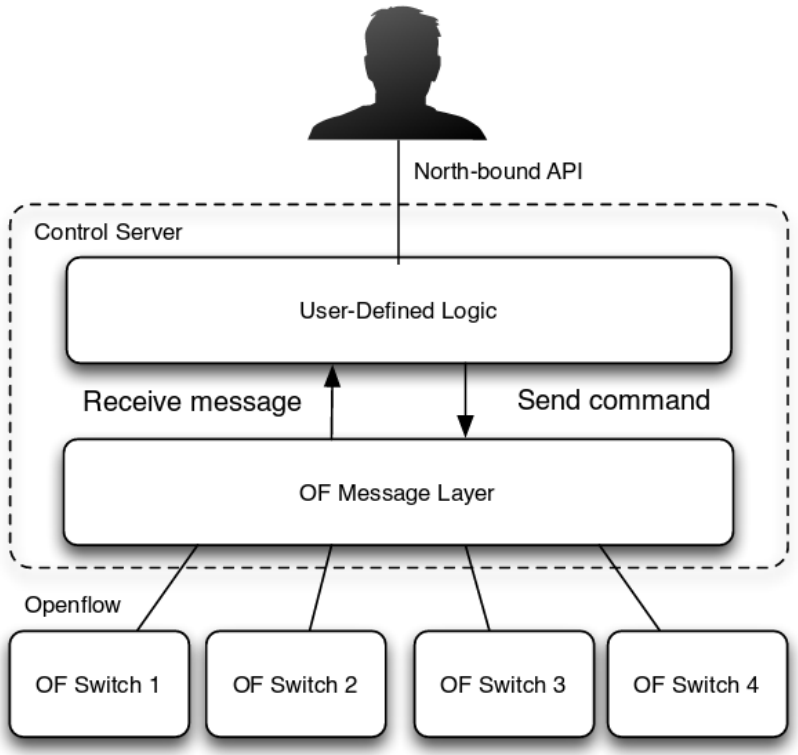

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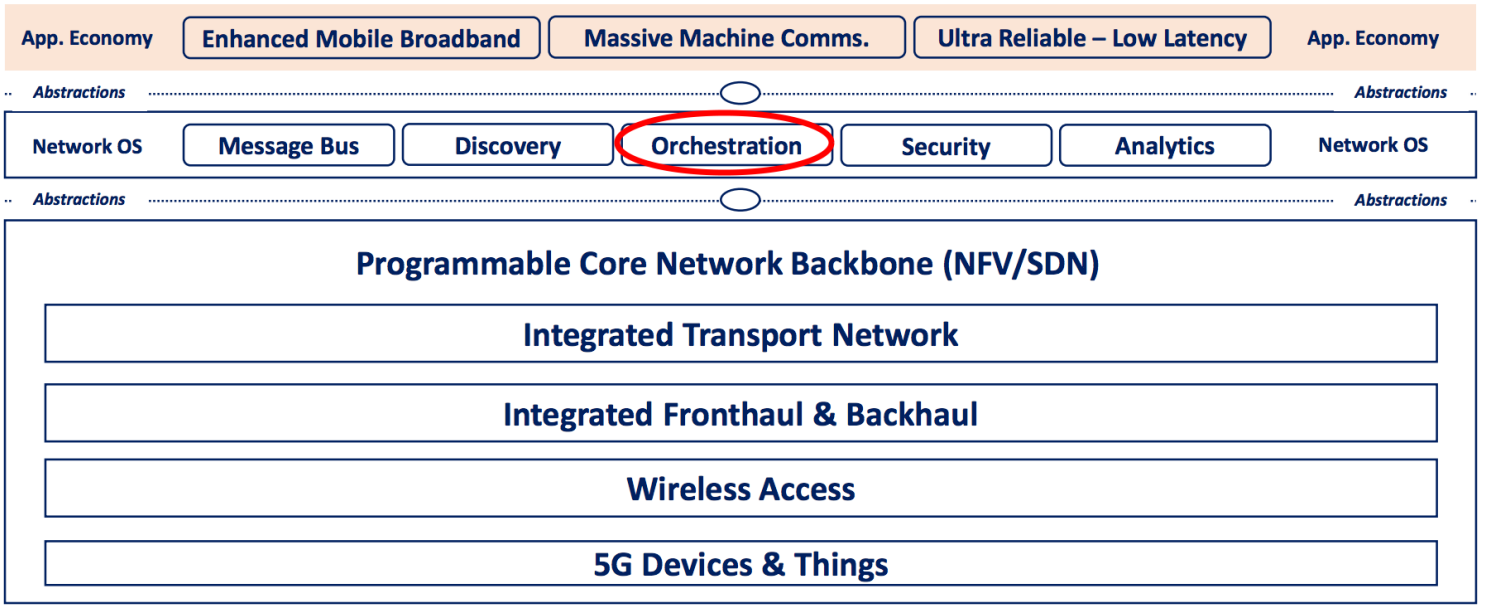
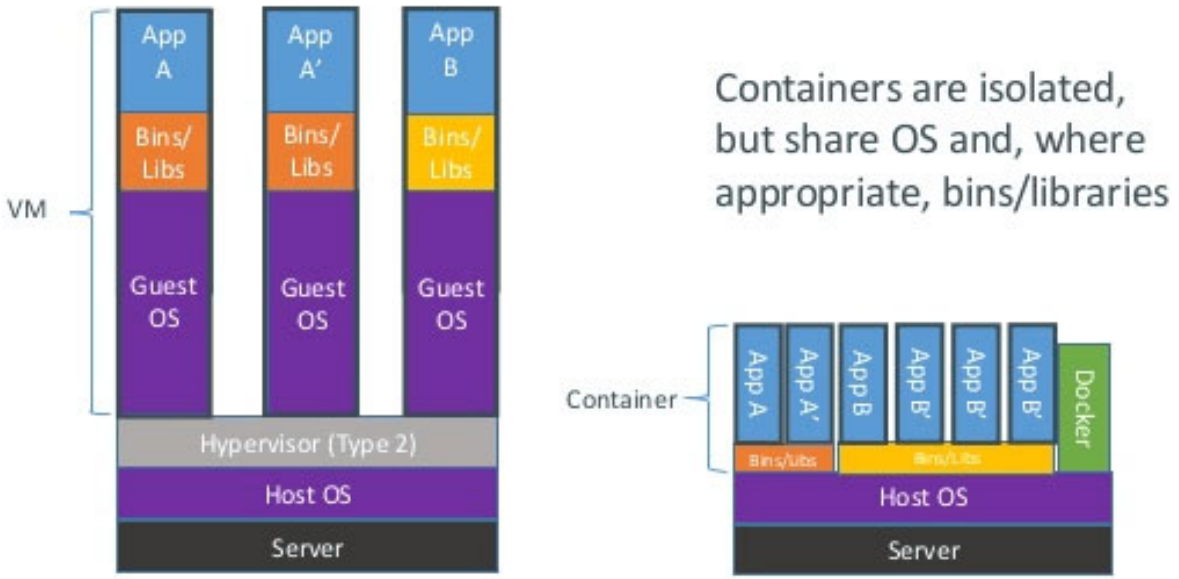


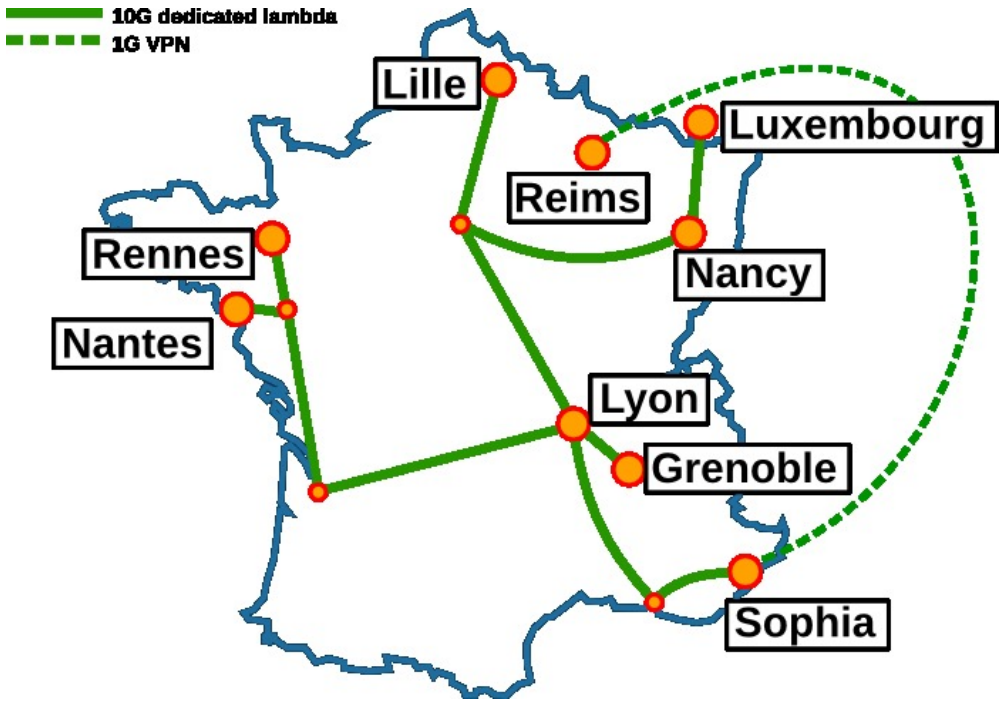
Virtualization and Linux Containers

Virtual Machines (VM) vs Linux Containers.



Large Scale Platform Grid5000

Grid5000 platform



Routing Strategies

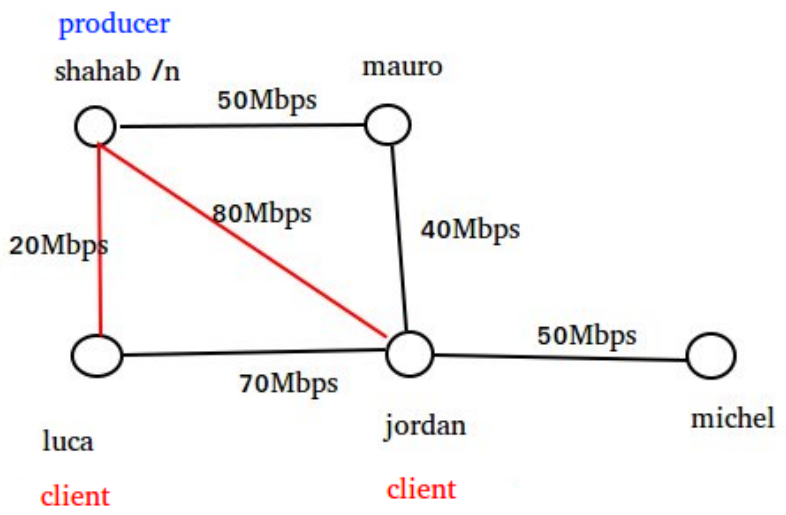
We proposed 4 different routing strategies for different situation of networks which can cover all of needs:

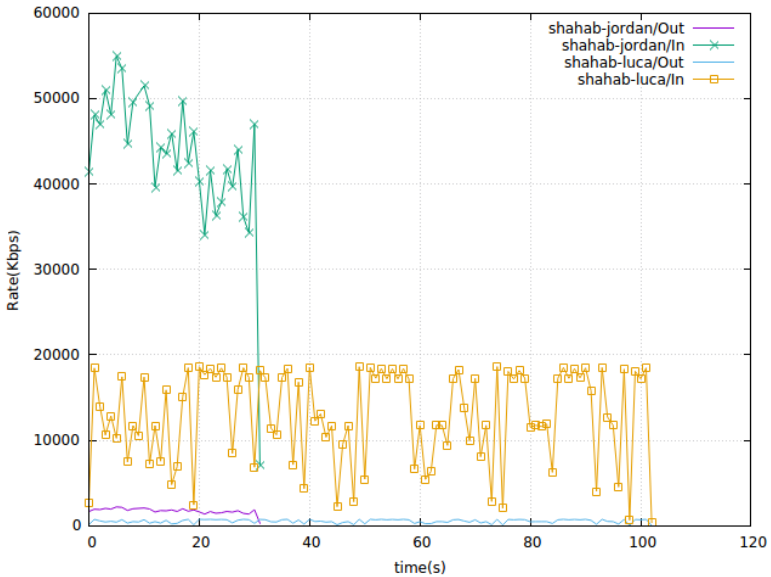
- **TreeOnConsumer** : N clients searching the same content from one repository detected by Lurch (Multicast mode).
- **TreeOnProducer**: One client who gets the packet from N Repositories of needed data.
- **MinCostMultiPath**: Using different paths with Equal Cost to retrieve the data using a proper 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

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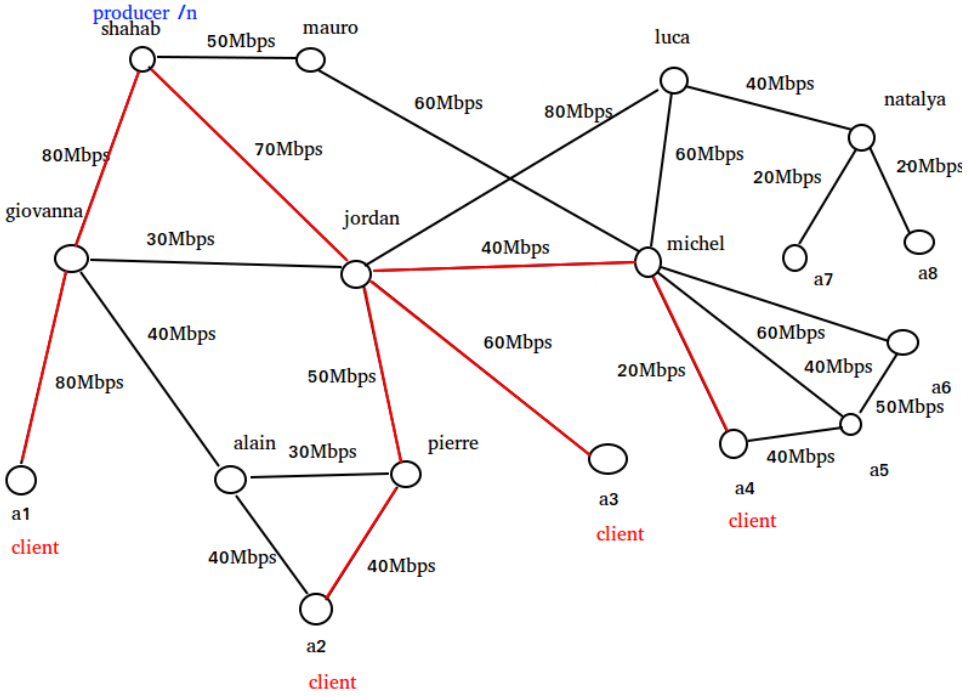
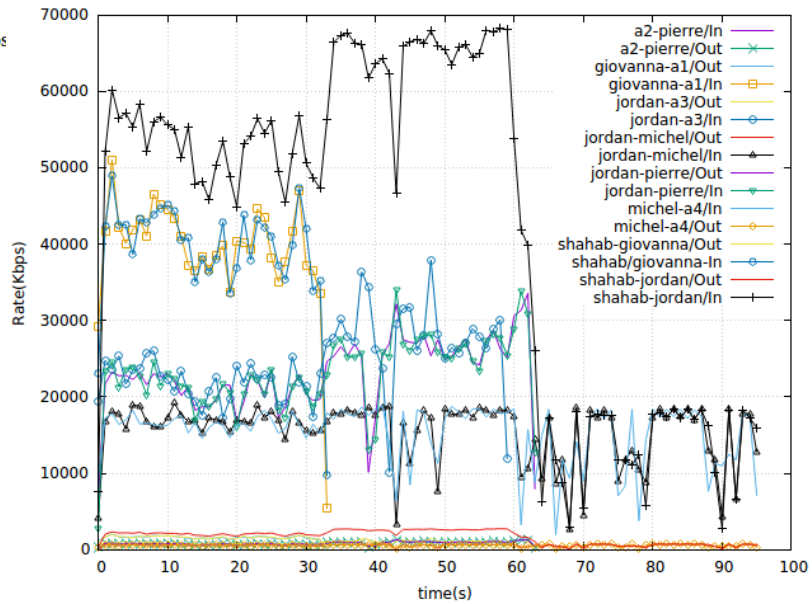
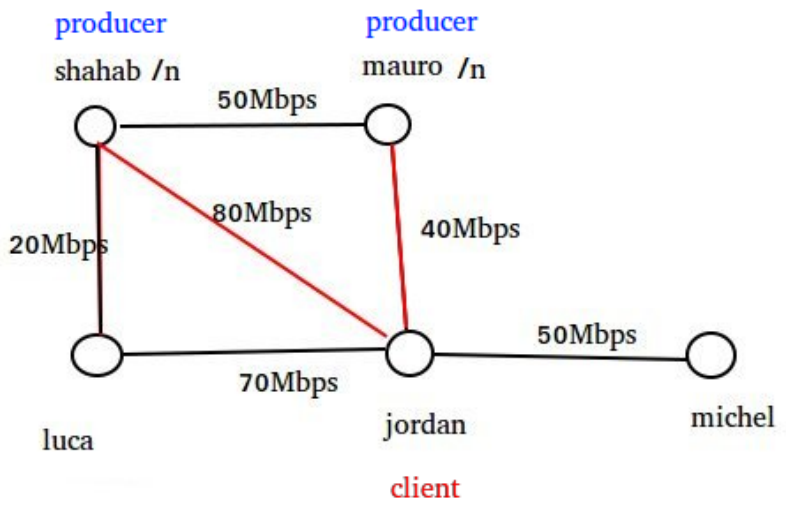
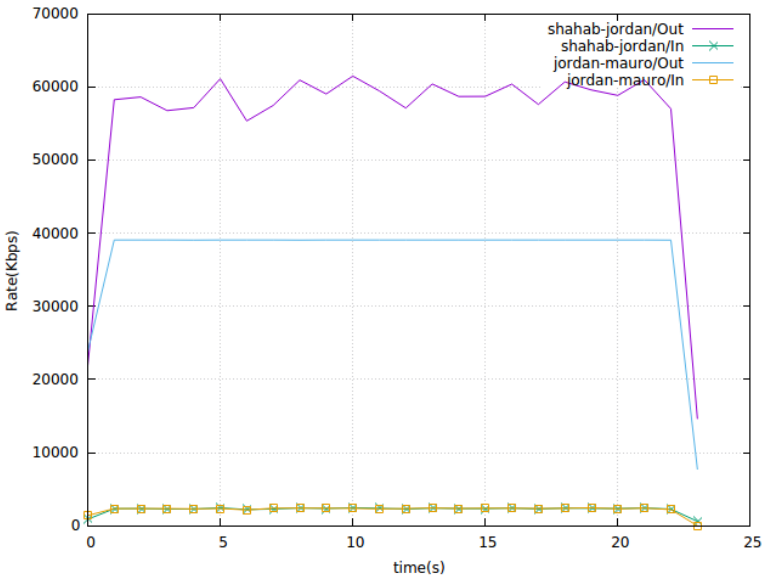




TreeOnProducer

One Consumer to multiple producer.





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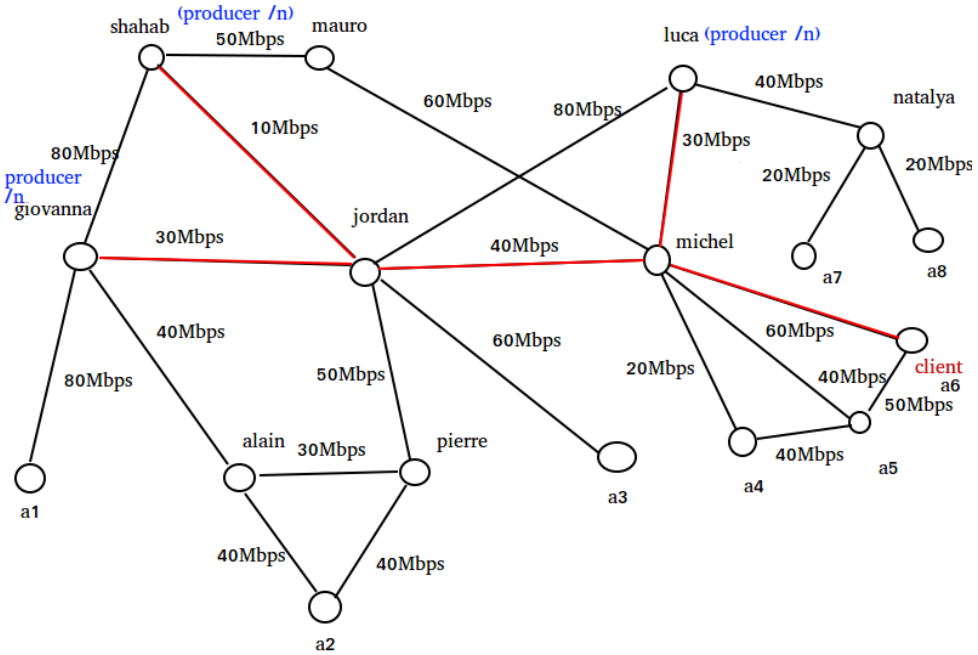
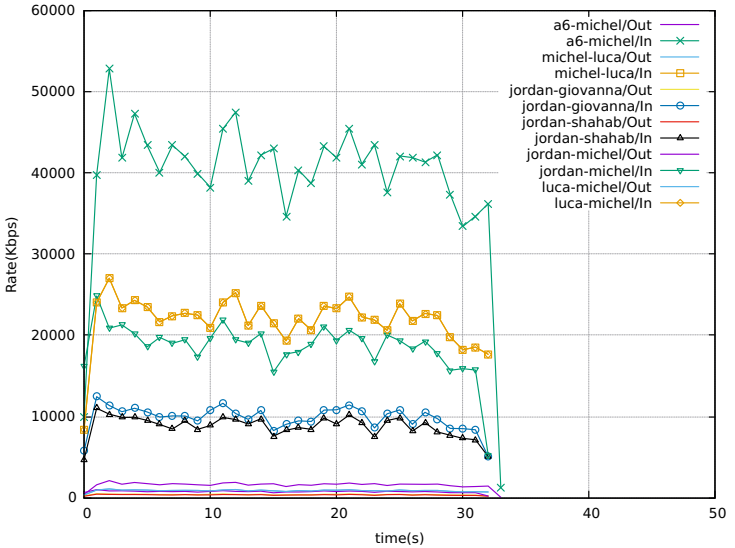
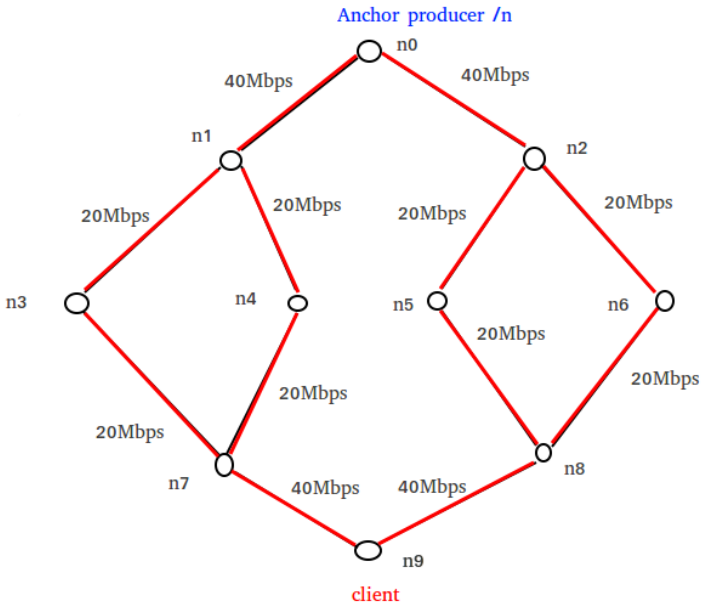
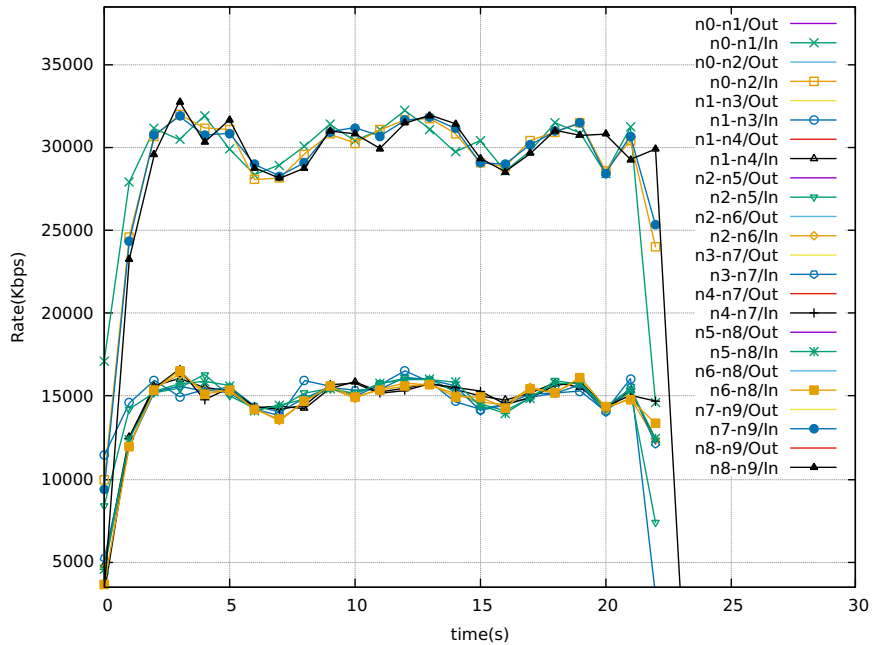




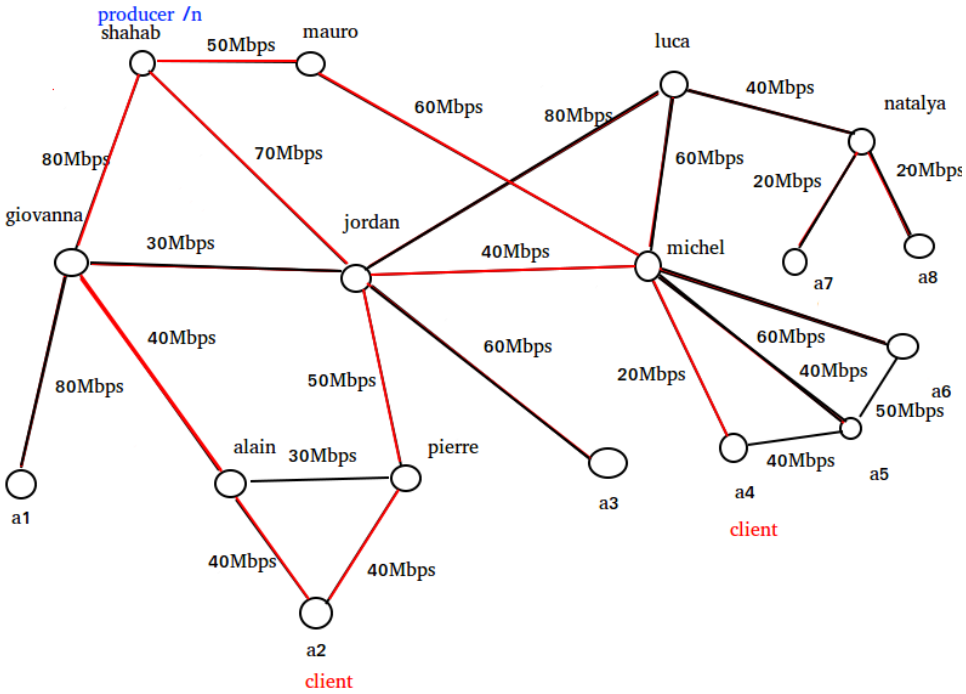
MinCostMultiPath

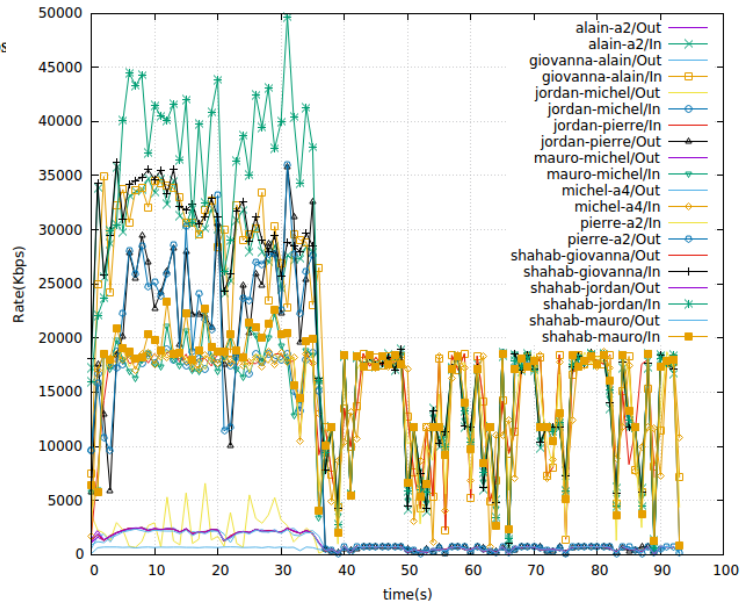
Load balancing strategies in equal cost multipath case.





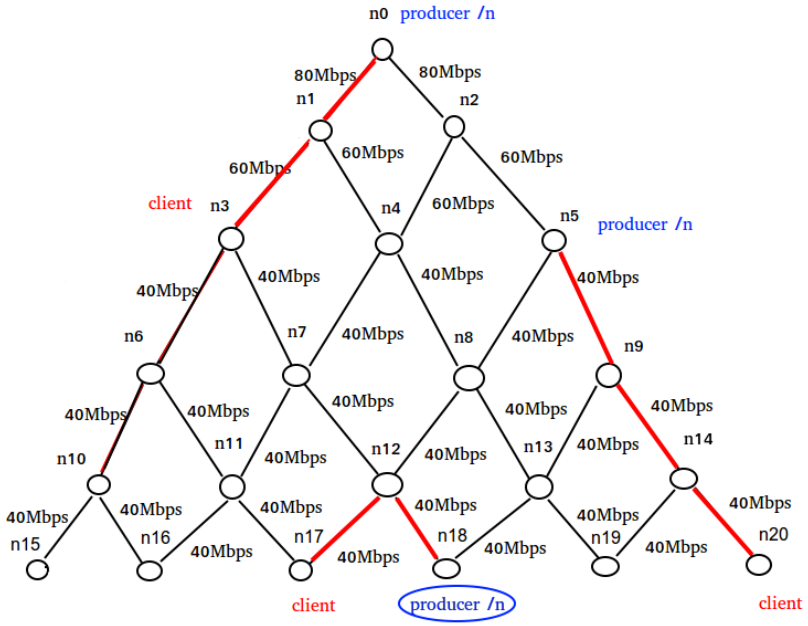
MinCostMultiPath

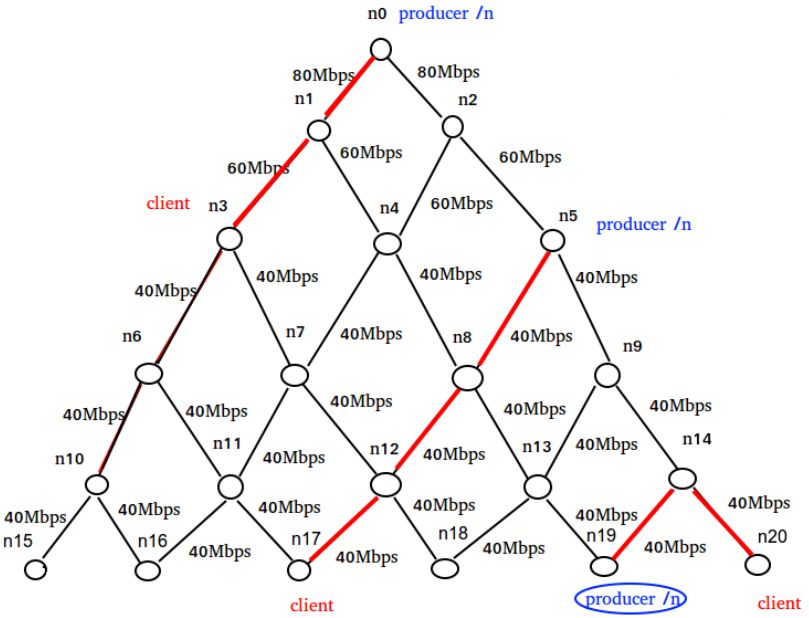




MinCostMultiPath

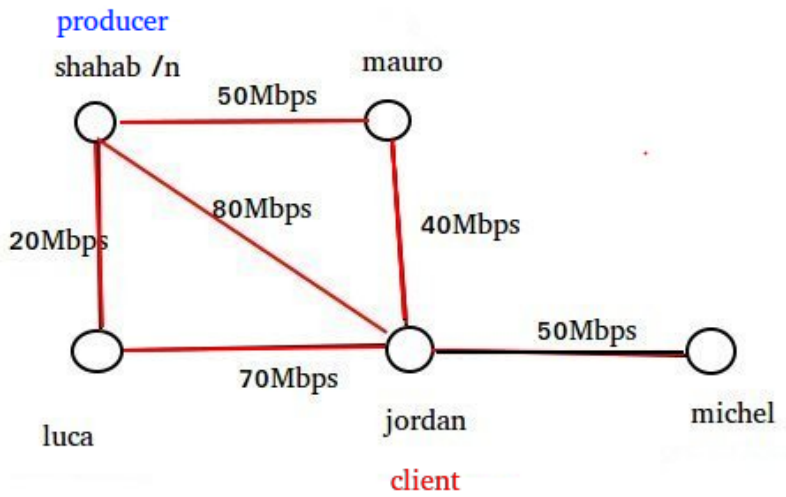
Producer Mobility with Routing update.

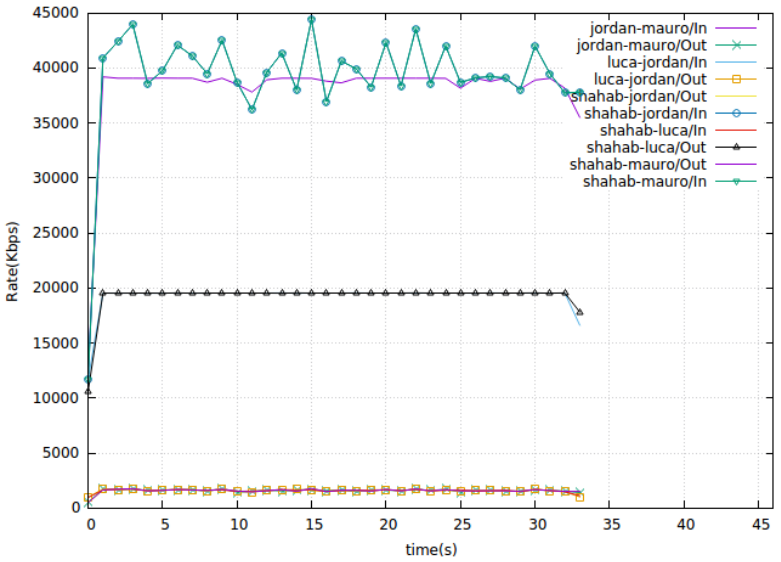




Maximum Flow

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





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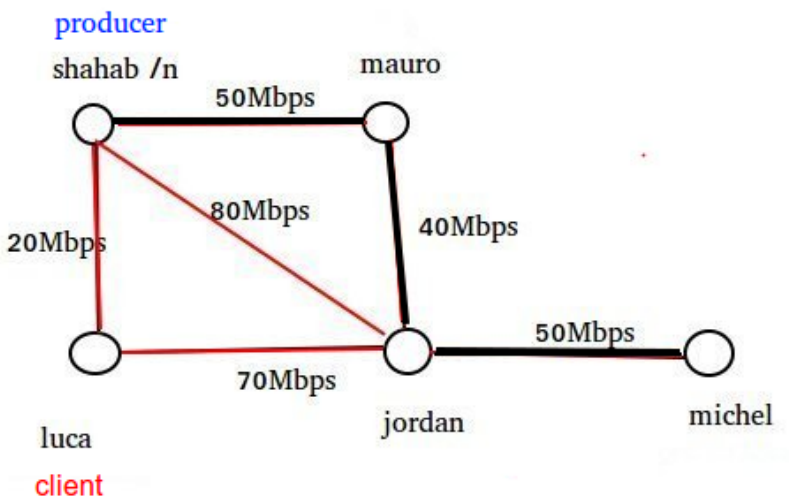

Plan

Conclusion

- There is always some limitations in practical against pure theoritical works which can be seen when you work on experimental platforms.
- ICN is one of the most challenging domain who has a lot of field of work and domain in research and development.
- In Engineering there is always bottlnecks, understanding and discovering of where these bottlenecks are the responsbility of genius engineer.
- Coding is beautiful tool because through it you can realize your ideas in real world.


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