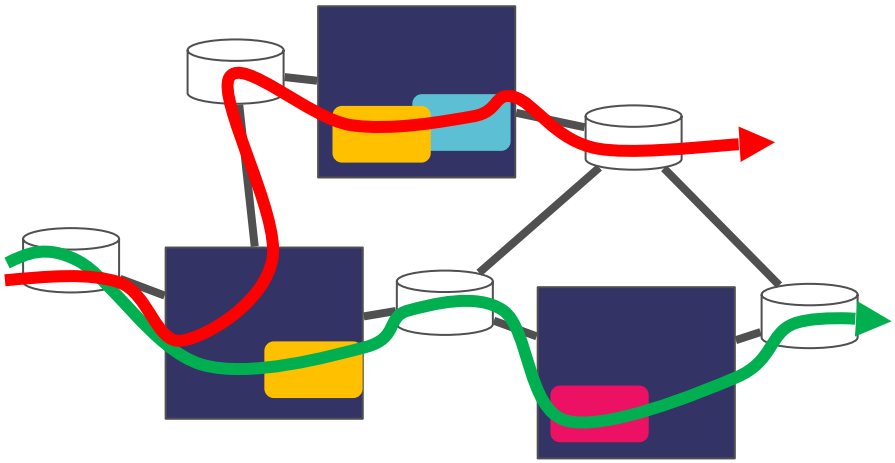
Let There Be Chaining: How to augment your IGP to Chain your Services

Adrien WION (Thales/Telecom Paris)

Advisors: Mathieu Bouet (Thales), **Luigi Iannone (Telecom Paris)**, Vania Conan (Thales)

Service Function Chaining



Services
- Sequences of network functions
- Dynamic per flow rules steer traffic into virtual appliances

Current practice: Centralized control

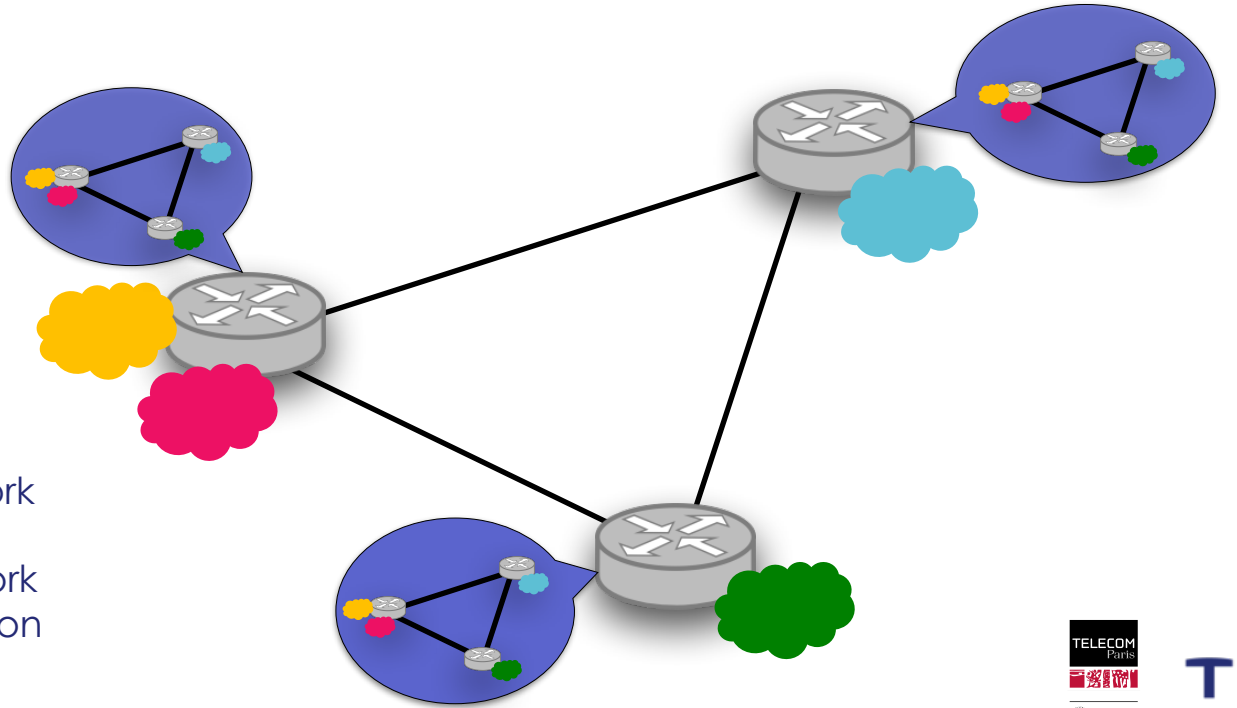
Problems
- Single Point of Failure
- Scalability
- Legacy Interoperability
- No Incremental Deployment
- Under exploitation of in-network resources

Proposal: Augment the IGP and make it function aware

TELECOM Paris
IP PARIS
THALES

Exploiting the existing in-network resources

If you have a large network you have an IGP (Interior Gateway Protocol)



Network

Network Function

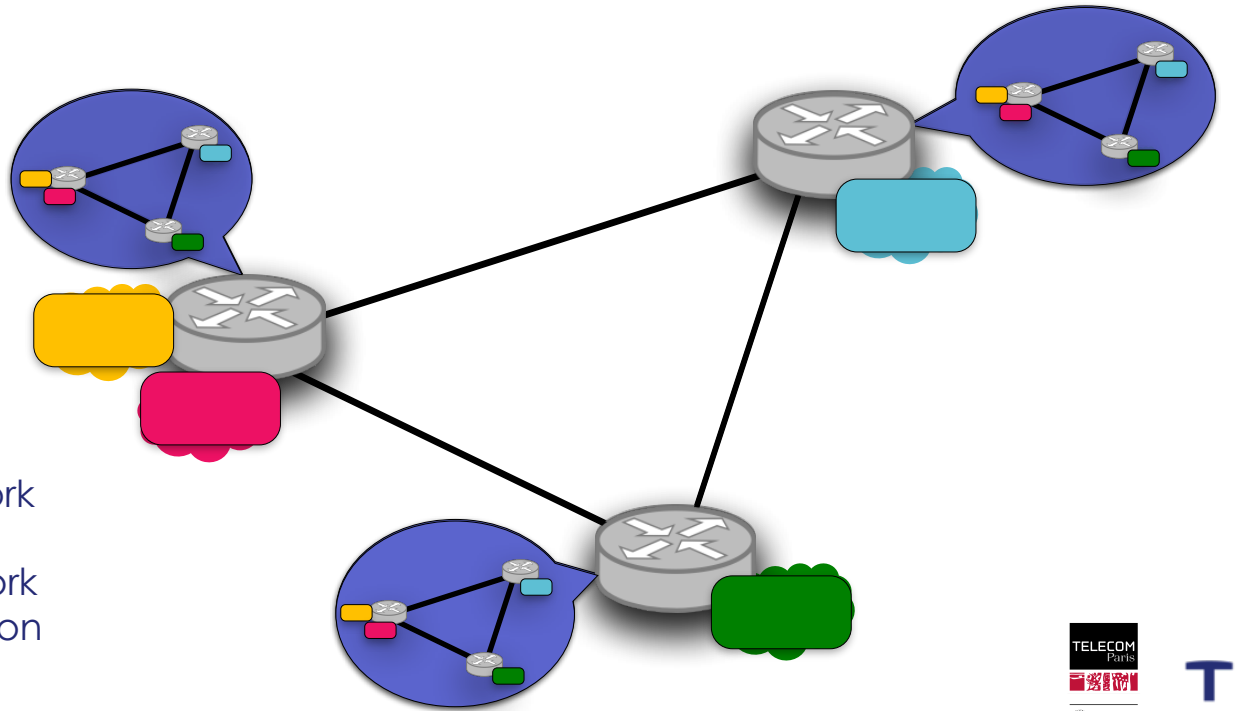
TELECOM Paris

IP PARIS

THALES

Announced address are actually VNF

Idea(s): Binding an address to a specific function



Network

Network Function

TELECOM Paris

IP PARIS

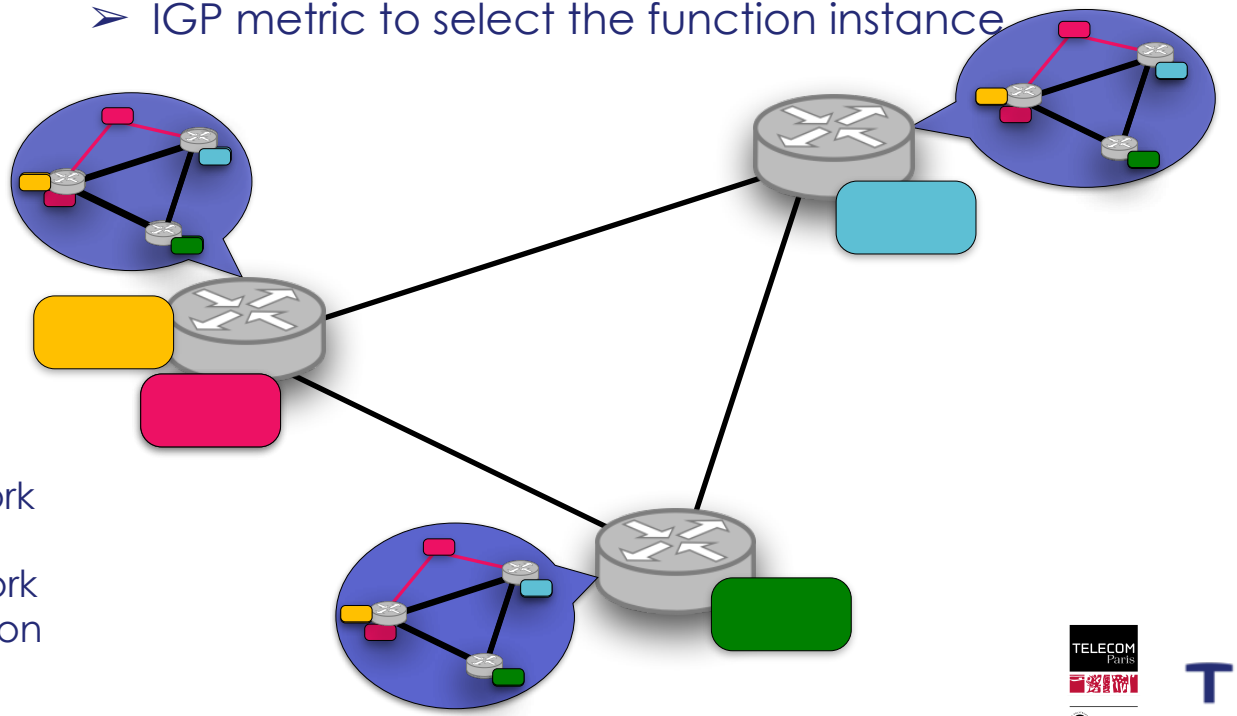
THALES

Leveraging on anycast addressing

Idea(s): Binding an address to a specific function + Anycast Addressing

Advantages

- Address to select the function
- IGP metric to select the function instance



Network

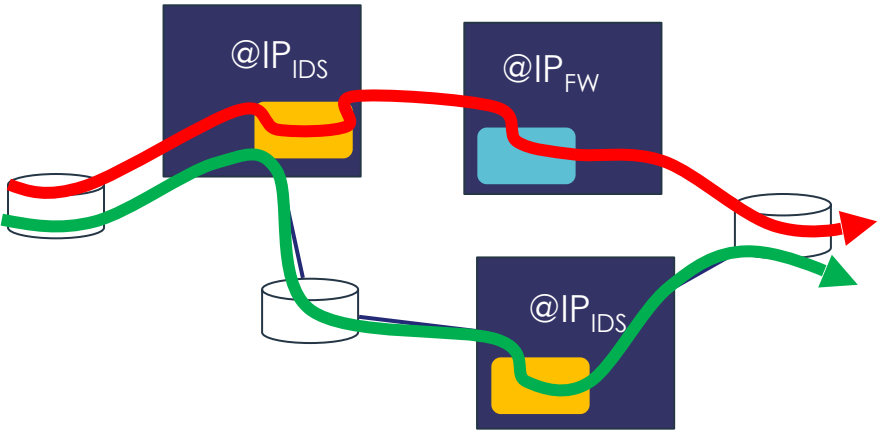
Network Function

TELECOM Paris

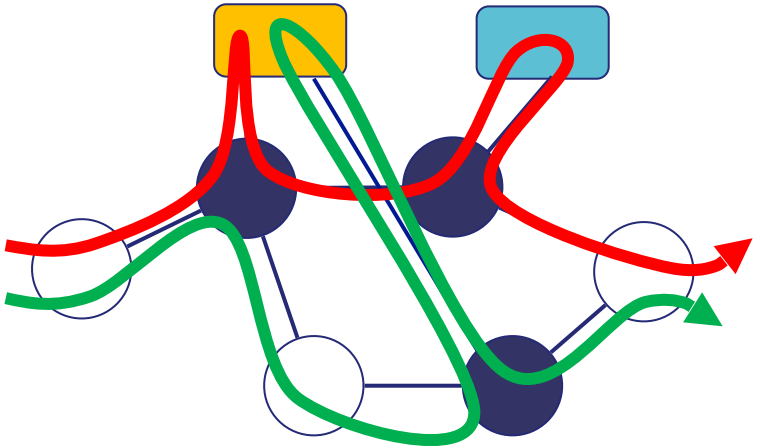
IP PARIS

THALES

Augmenting network layer routing



Network view



IGP Augmented View

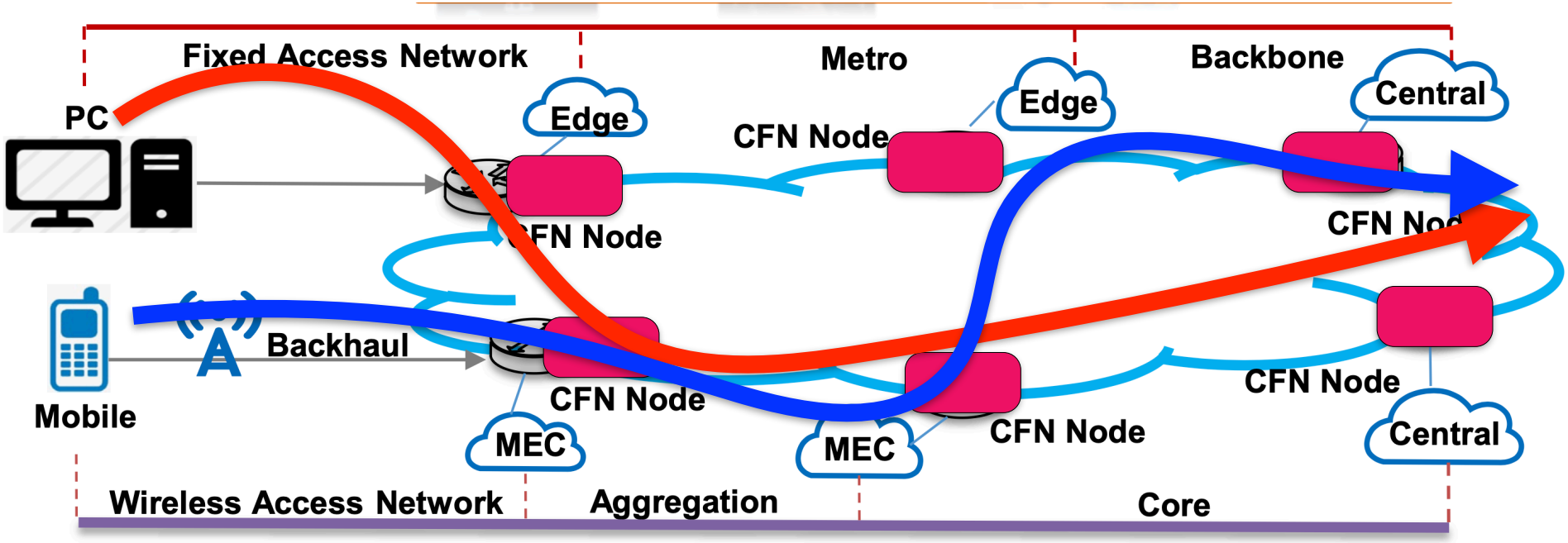
Augmented IGP topology:

- Service mapped to an anycast prefix
- Node advertise available service
- Routing decision taken with shared topology
- Routing decision is applied per flow

TELECOM Paris
IP PARIS
THALES

What about CFN?

- It works since the approach does not make any hypothesis on the placement

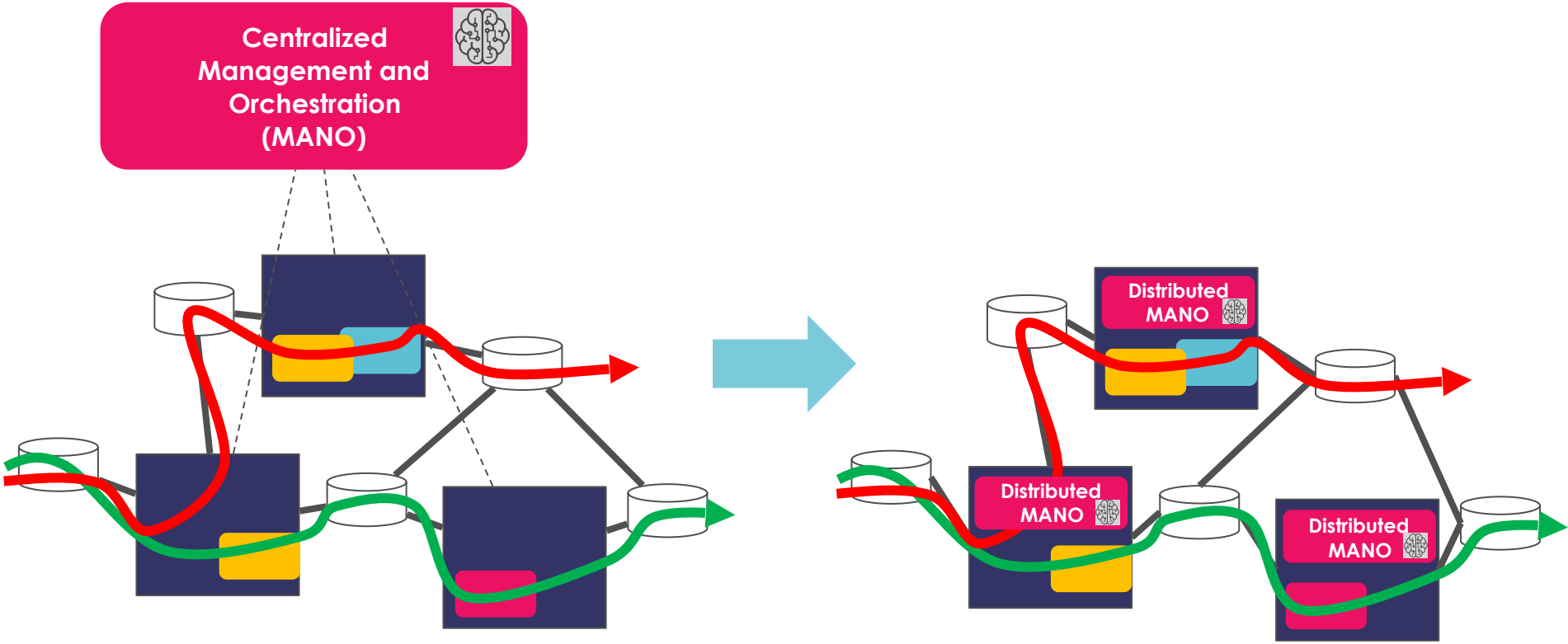


Summary

- Two-D feature: Dynamic & Distributed
- Dynamic anycast (Dyncast)
  - Identify a service at network layer
  - Consider computing load info, not always least cost
  - Dispatch on-the-fly, late binding of egress edge
  - Ensure flow affinity
- Control plane: BGP/IGP extension, any other protocol?
- Data plane: binding table, data encap/forwarding

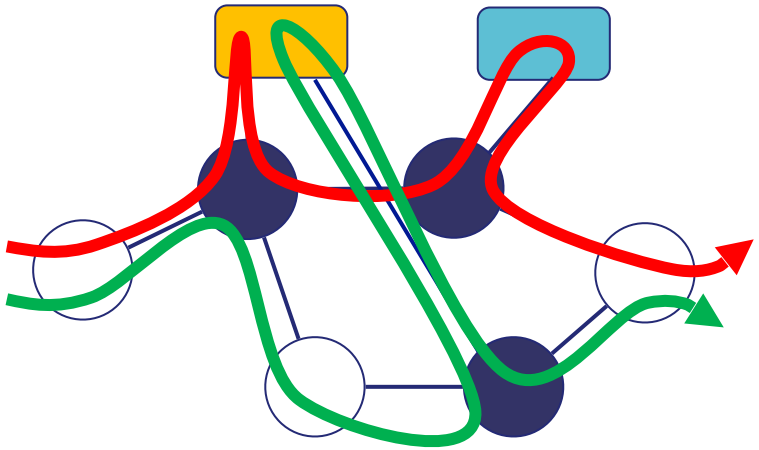
Early version of CFN slides: Courtesy of Li Yizhou

Dynamic and distributed

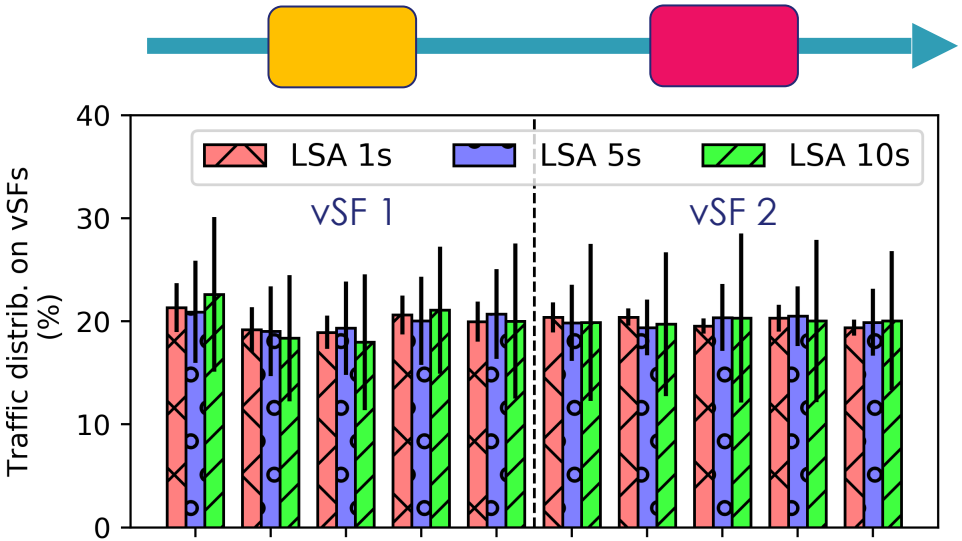


Dynamic Anycast

- Identify service at network layer
- Consider computing load
- Dispatch on the fly
- Ensure flow affinity



IGP Augmented View



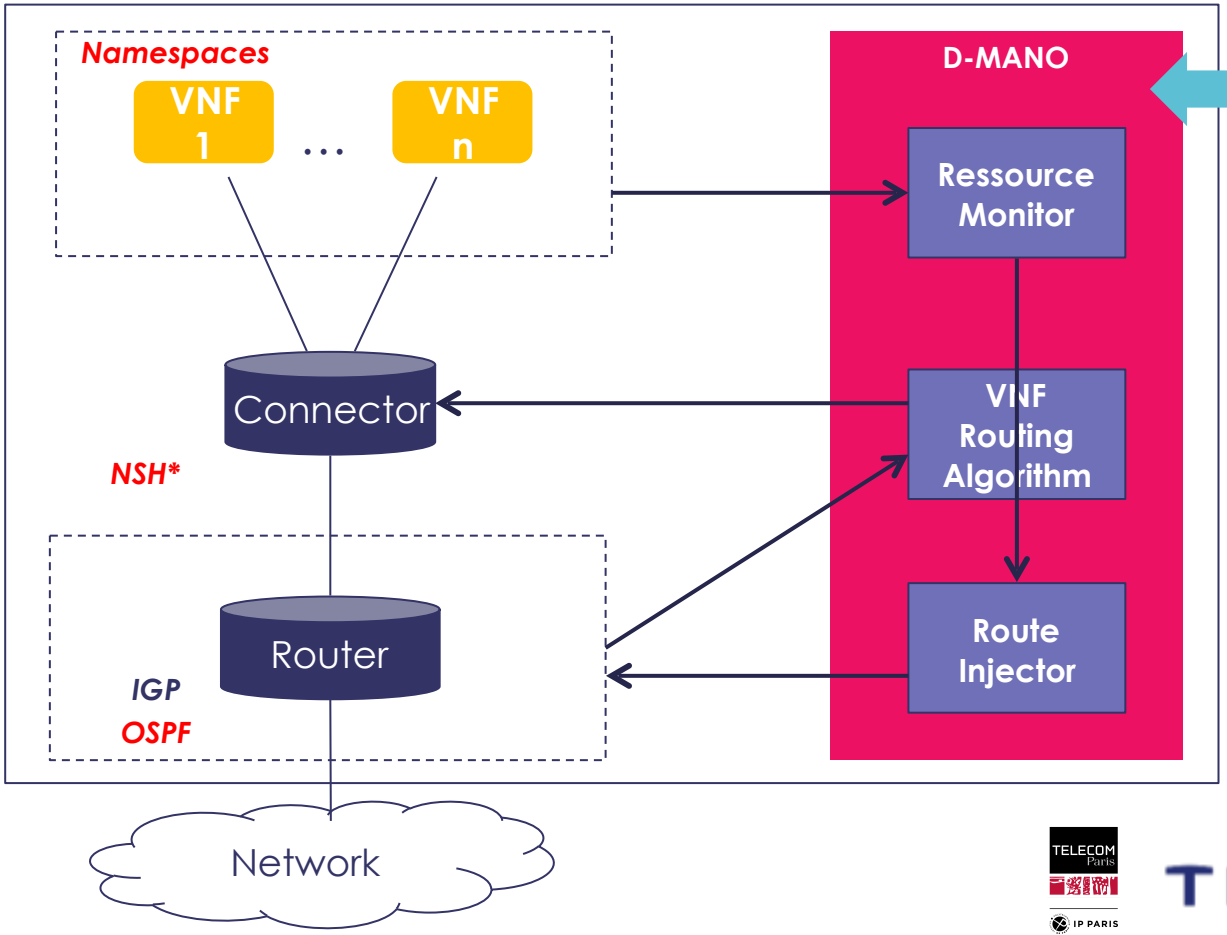
Control Plane BGP/IGP: Implemented on OSPF (BGP planned)

Virtualization

Encapsulation

Routing

FRROUTING



**Network Service Header (RFC 8300)*

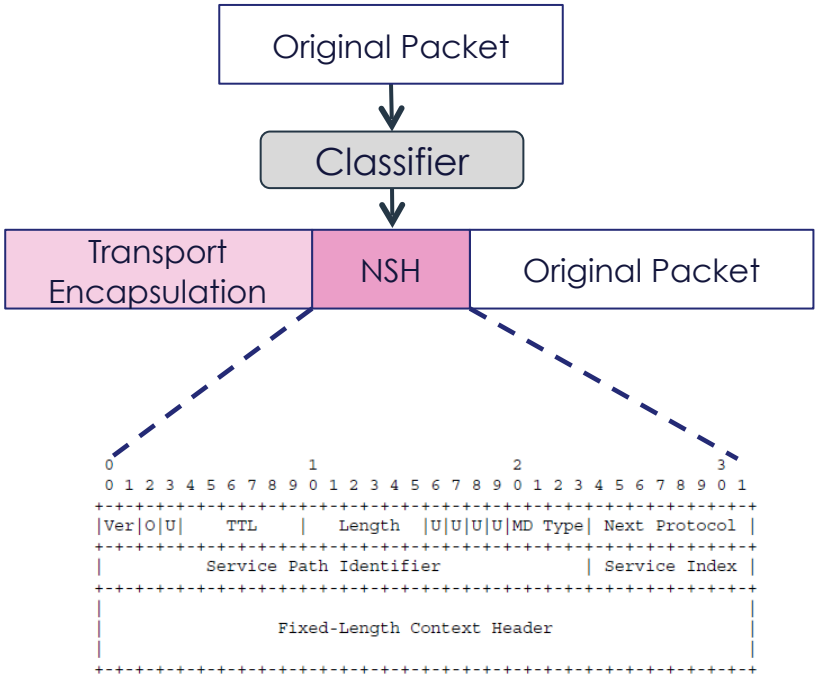
TELECOM Paris

IP PARIS

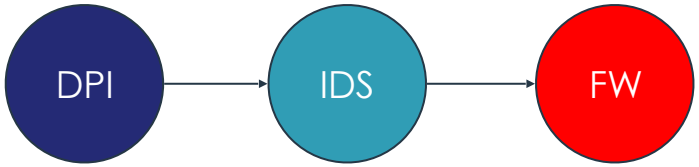
THALES

Data Plane: Steering traffic through SFC

Network Service Header (RFC 8300)



Service Path Identifier represents a SFC



Once a packet has been processed by a vSF Service Index field is incremented

NSH is transport encapsulation agnostic

NFV Routers map NSH fields with the next destination to reach

NFV Routers cache per flow routing decision to preserve flow affinity

Thanks

// || ??

TELECOM Paris

IP PARIS

THALES