

# Topology Modeling experience at Telefonica

[Experiences from the iFusion project](#)

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Side Meeting on digital map

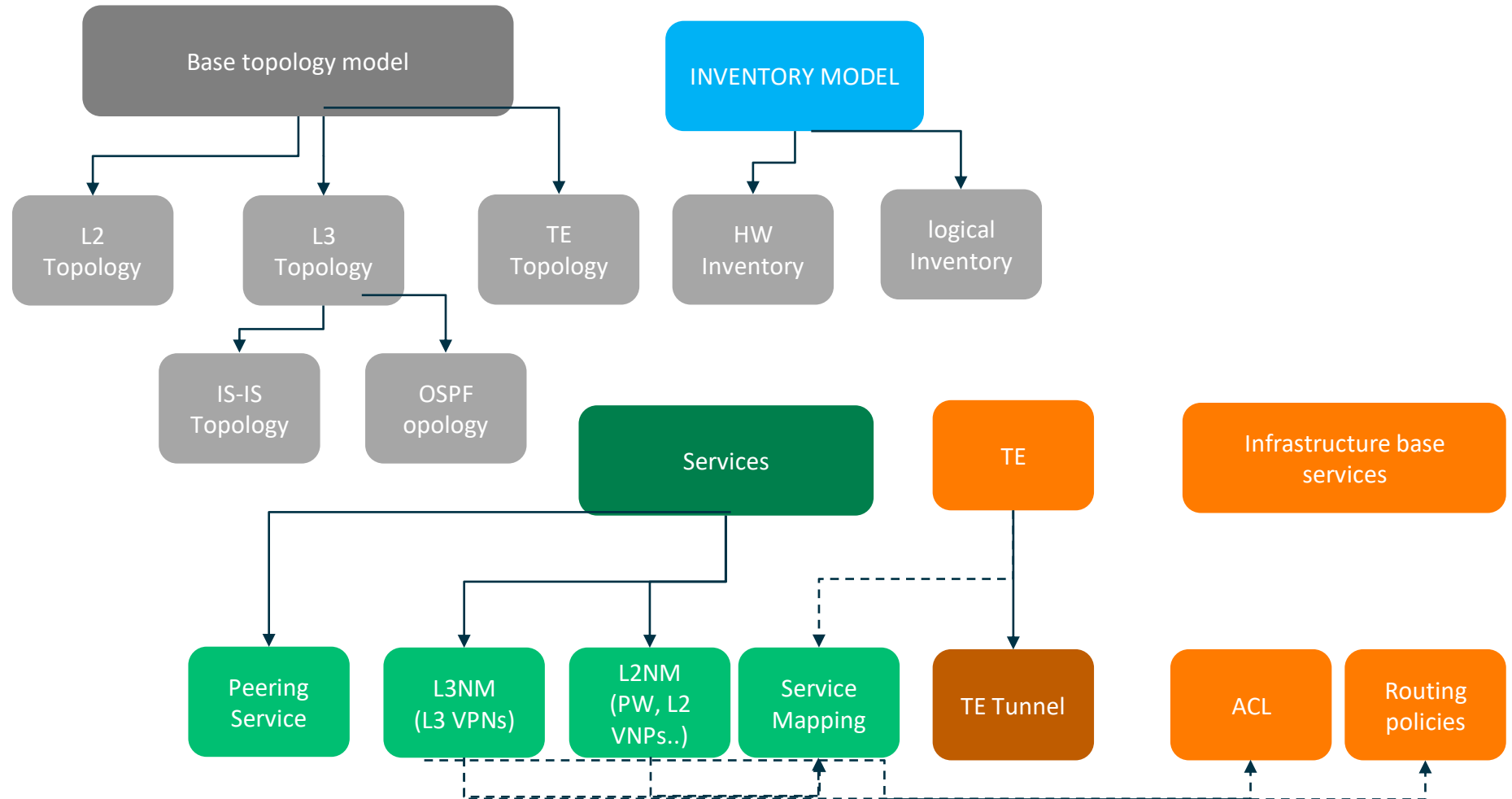
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# What do we want to achieve?

- Goal of iFusion: offer a yang-based representation of Telefonica networks, based on layers, complemented by a live inventory view, a collection of the most common Telefonica services and streaming telemetry.
- Consumers:
  - Planning tool performing capacity planning, what if scenario...
  - Visualization tools
  - Service orchestrator
  - Inventory (where conciliation vs planned network is done)
  - Multiple OSS tools
- Premises
  - Use IETF Yang models as the modelling base
- Methodology
  - Design and implement use case by use

# Overall view of the models

- The Yang models are interconnected, allowing to navigate



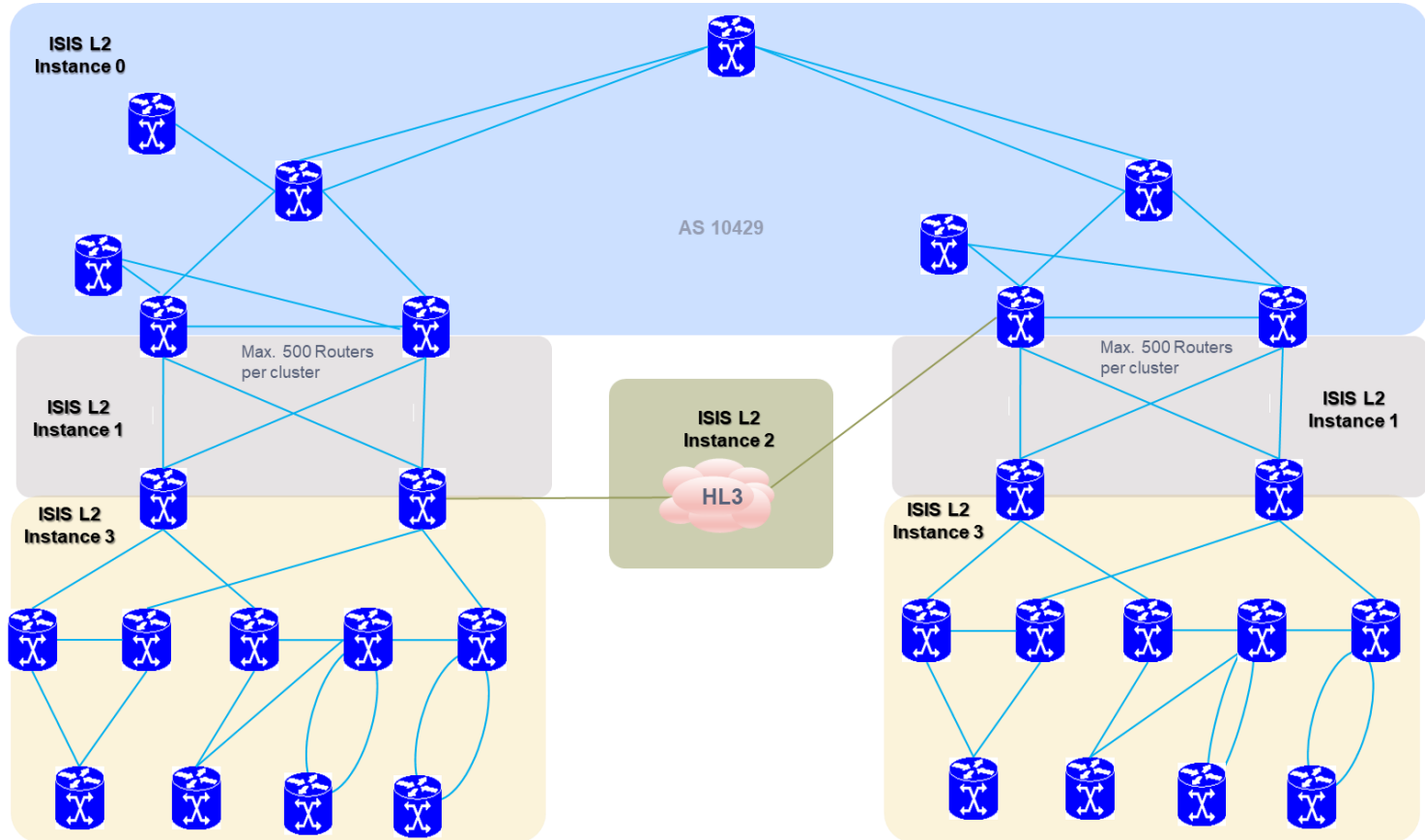
# Topology for planning Use case

- This use case aims at providing the Layer 3 IGP topology information to Network Planning and Visualization tools in a structured manner via NBI of the IP/MPLS SDN Controller using standard IETF representation.
- Network scenario: IP/MPLS network in which every router participates in one or more IGP processes.
- The scope is:
  - Networks with only IS-IS for some OBs (current and target scenario)
  - Networks with mixed IS-IS and OSPF domains.
  - Some routers participate in two or more domains
  - Legacy design inter-AS links are being removed
- This use case does not consider nodes or links that do not participate in an IGP (e.g. access nodes, CE nodes, etc)

# Design principles

- Based on current RFC 8345 premises
- One base layer 3 network
- One network per domain
- Networks interconnected via supporting node
- One base layer 2 network with L2 links and LAGS
- Limitations:
  - No inter-domain links
  - No relationships between networks
  - Te tunnels that become adjacencies in the IGP (circular dependencies between layers)

# Sample network to model



# Base Layer 3 network

- Base layer 3 network
  - This network instance will contain all the IP nodes and all the IP interfaces in the network (as termination points inside the nodes).
  - This network will not contain links.
  - The network-types property include ietf-l3-unicast-topology:l3-unicast-topology, and NOT include any IGP related type like ietf-l3-isis-topology:isis-topology. This is the form to distinguish the base layer 3 topology from the IGP topologies.
  - The supporting-network property is used to link to the lower layer topology (flat physical topology with the layer 2 links, including LAGs)
- Base layer 3 network: nodes
  - Each IP/MPLS router (speaking layer 3) in the network that is part of at least one IGP MUST be part of this network
  - (node-id) Unique node-id. No hard requirement, but, to facilitate visualization, the ne-id used in the controller and inventory is used to refer to the node.
  - (l3-node-attributes.name) Name: The configured name in the device.
  - (l3-node-attributes.router-id): Router-id as configured in the device (and advertised by BGP-LS).
  - List of termination points: the IP interfaces that have a link in at least one IGP. Other links were not yet modeled.
  - Termination point ID (tp-id). It is the name of the interface/subinterface configured.
  - Supporting termination point (supporting-termination-point). A layer 3 termination point refers to a logical concept, configured in the routers, and typically with an assigned IP address (but in unnumbered IP interfaces). The supporting termination point MUST be the termination point in the layer-2 network (e.g. a hardware Ethernet port).
  - IP address (ip-address). Each layer3 termination point can have one IP address (normal case), or none (unnumbered interfaces).

# IGP network

- An IGP domain in iFusion is defined as the collection of nodes and links that participate in the same IGP process.
  - E.g nodes and links that are announced with the same combination of AS number / Instance ID belong to the same domain.
  - If a node and/or layer termination point present in the base layer 3 topology, participates in more than one IGP it will be present in multiple IGP domain networks.
- The ietf-network instance includes as network-types property:
  - l3t:l3-unicast-topology (IP packets are routable)
  - In ISIS case, isisnt:isis-topology
  - In OSPF case, ospfnt:ospf-topology
  - To include the bandwidth, delay information and color, tet:te-topology
  - To include delay and bandwidth performance measurements , tet-pkt:te-packet under the previous property
- Nodes and links are included
- Links contain IGP specific information AND Traffic engineering related information