- Modeling the Digital Map based on RFC8345: Sharing Experience

- IVY Relationship

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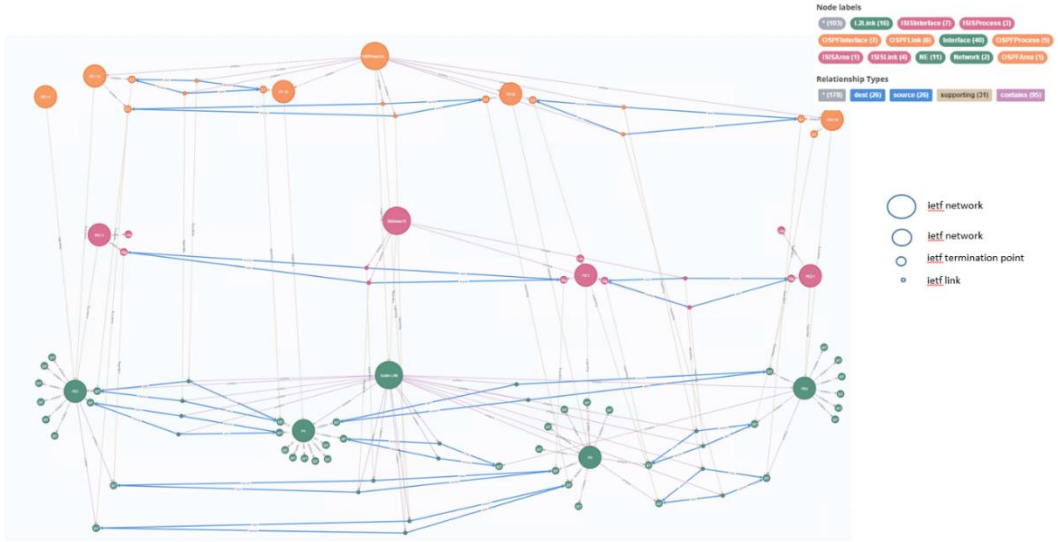
Digital Map Modelling Objectives

- *Can RFC 8345 YANG model be a good basis to model a Digital Map?*
- *How the different topology related IETF YANG modules fit (or not) together?*
- *Modelling of digital map entities & relationships, how to build aggregated entities and relationships from the device view to the network-wide and service views*



- *Does the base RFC 8345 model support the key requirements that emerge for a specific layer?*
- *Modelling multiple underlay/overlay layers from physical to customer service layer. To what extent it is easy to augment the base model to support new technologies?*
- *Can the base model be augmented for any new layer and technologies?*

Core Digital Map Use Cases and Requirements collected from Operators so far

Use Cases:

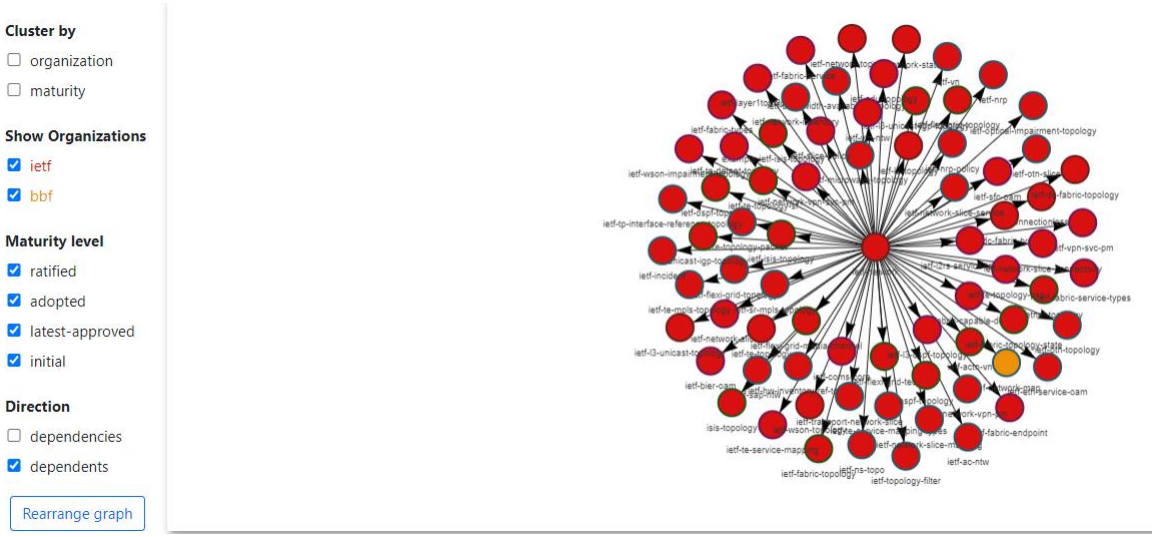
- Network Inventory Queries
- Service Placement Feasibility Checks
- Service->Subservice->Resource
- Resource->Subservice->Service
- Intent / Service Assurance
- Service E2R and Per-Link KPIs on the Digital Map (delay, jitter and loss)
- Capacity Planning
- Network Design
- Simulations
- Closed Loop

Requirements:

		RFC8345-based
1.	Basic model with Network, Node, Link, Interface, Layers	Ok
2.	Layered from physical to customer service (intent)	Ok
3.	Open and programmable (read/write for what-if for DM)	Ok
4.	Standard based Digital Map model and API	Ok
5.	Cross-domain	Ok
6.	Semantics for layered network topologies	Partial
7.	Relationships	Partial
8.	Extensible with metadata	
9.	Pluggable for specific functional modules • inventory, KPIs, .. • Note: not everything will be in YANG	
10.	Optimized for graph traversal	

Different users may use different layers and have different requirements

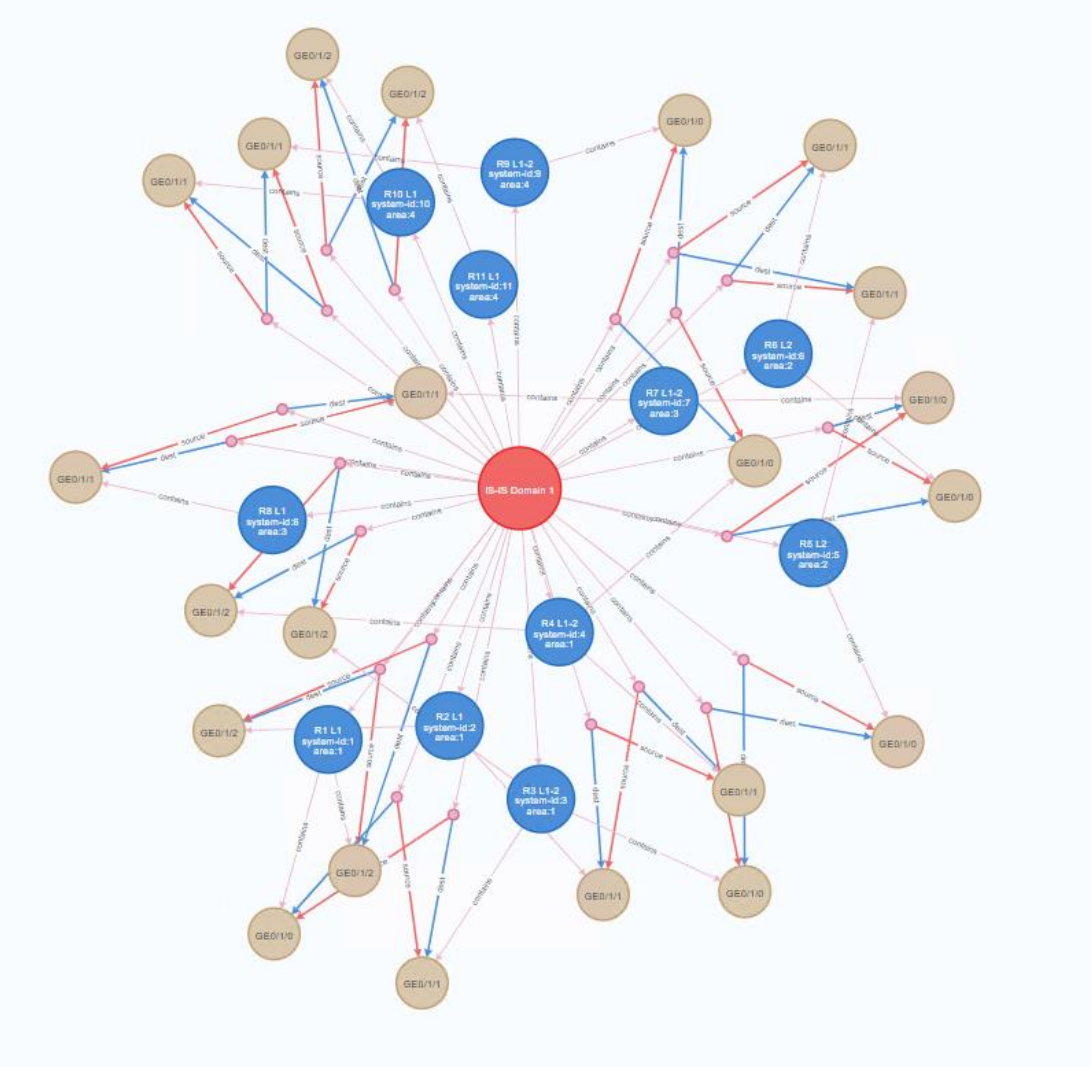
Our Process

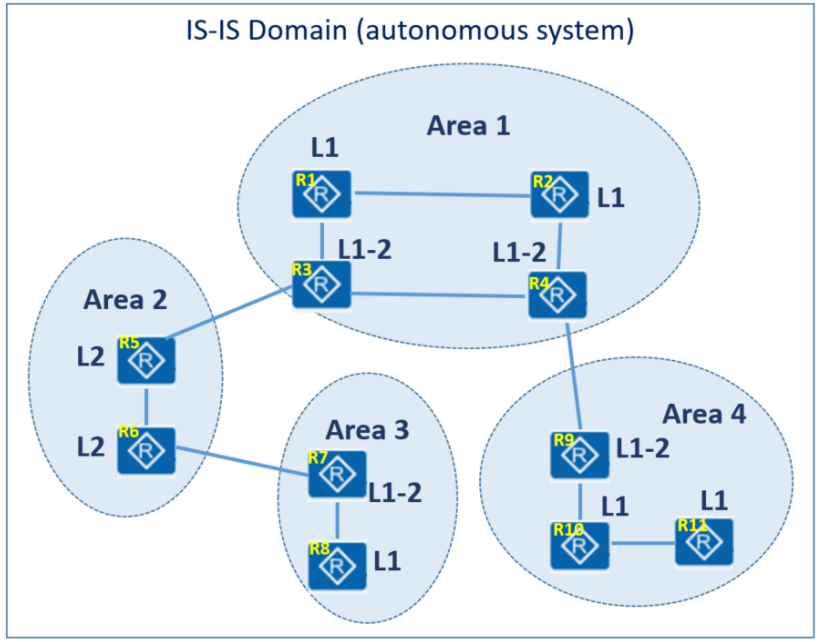


- Each Digital Map layer may for a specific user, for some specific use cases
  - Ex: layer 3, for capacity planning, routing similar
- PoC'ed multiple technologies => strong focus on the IGP topology drafts, to start with
- By analyzing multiple layers, we will draw all conclusions:
  - Is RFC 8345 a good basis, should we do a bis, etc?
  - Should we have some guidelines on how to augment RFC8345? Interface, tp, etc.

Modelling IS-IS Areas (with RFC 8345 limitations)

IS-IS Domain is network. IS-IS Areas info in attributes

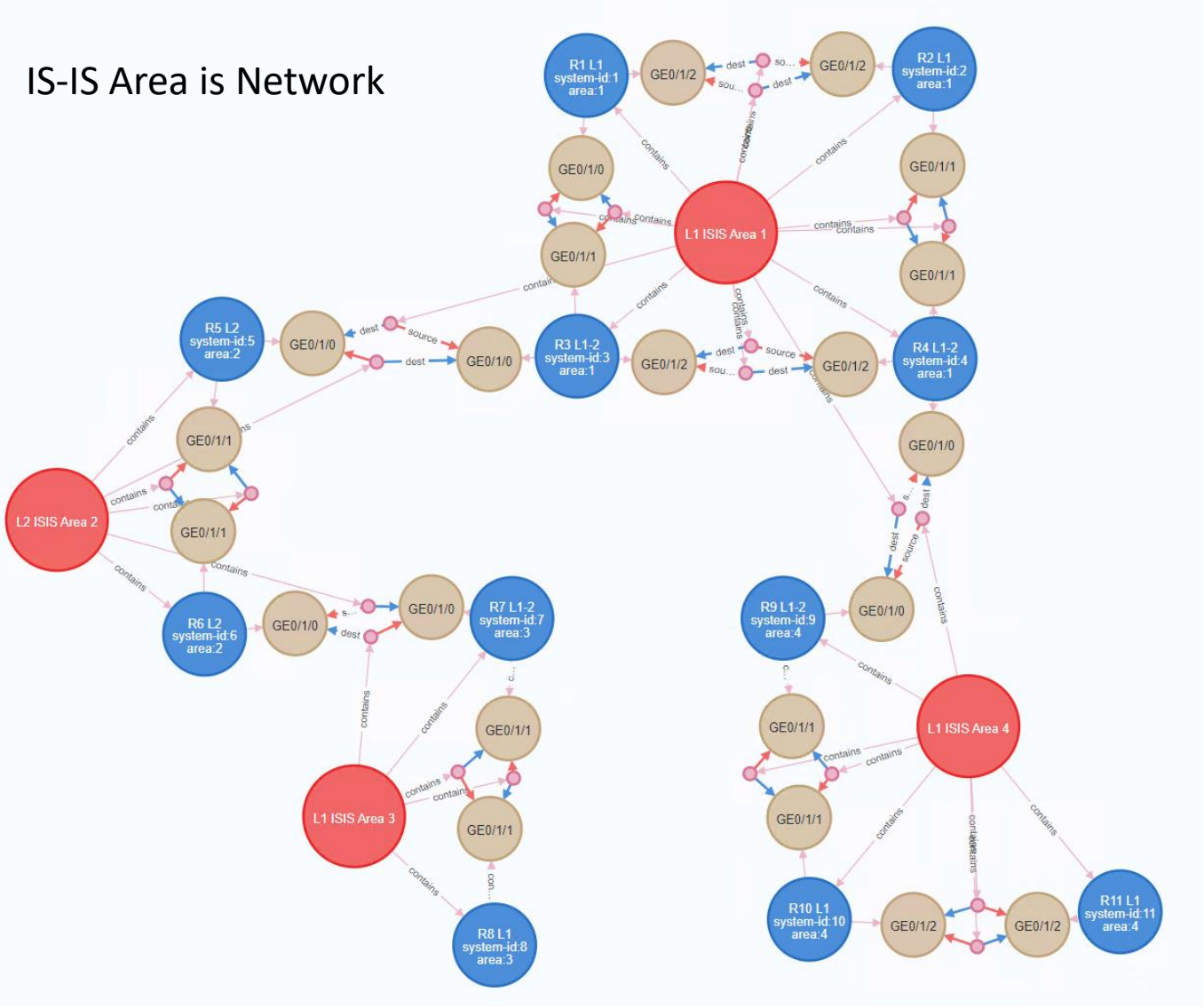


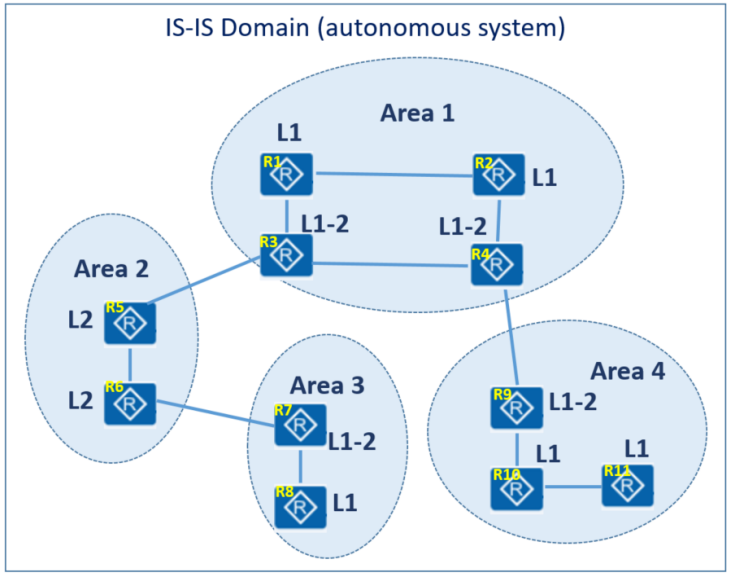


- IS-IS processes grouped in the IS-IS area via the specific IS-IS attribute
- applications would need to understand the meaning of the specific IS-IS attributes in order to understand IS-IS topology
- does not represent the topology of the IS-IS Domain via entities - relationships

Modelling IS-IS Areas (without RFC8345 limitations)

IS-IS Area is Network





- aligned with the real topology
- allows drill down from the AS->Areas->Processes
- scale
- aligned with the IS-IS topology model and the IS-IS network view in the manuals and training material, IS-IS area entity exists in the model

RFC 8345 Limitations for Digital Map Modelling

- Bidirectional links
- Multi-point connectivity (hub and spoke, full mesh, complex)

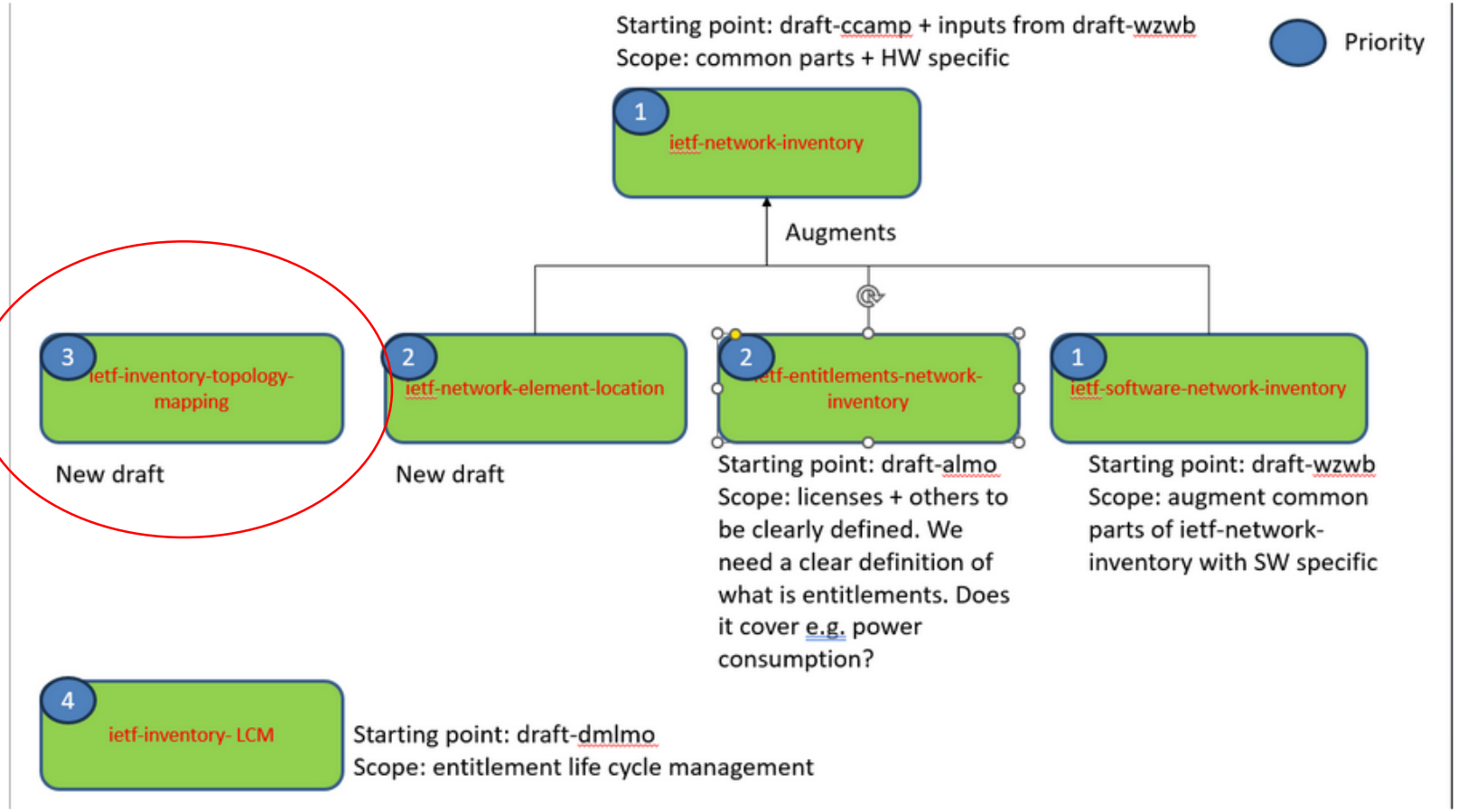
Proposed solutions in:
draft-davis-opsawg-some-refinements-to-rfc8345

- Links between domains/networks
- Networks part of other networks
- Nodes, TPs and Links in multiple networks

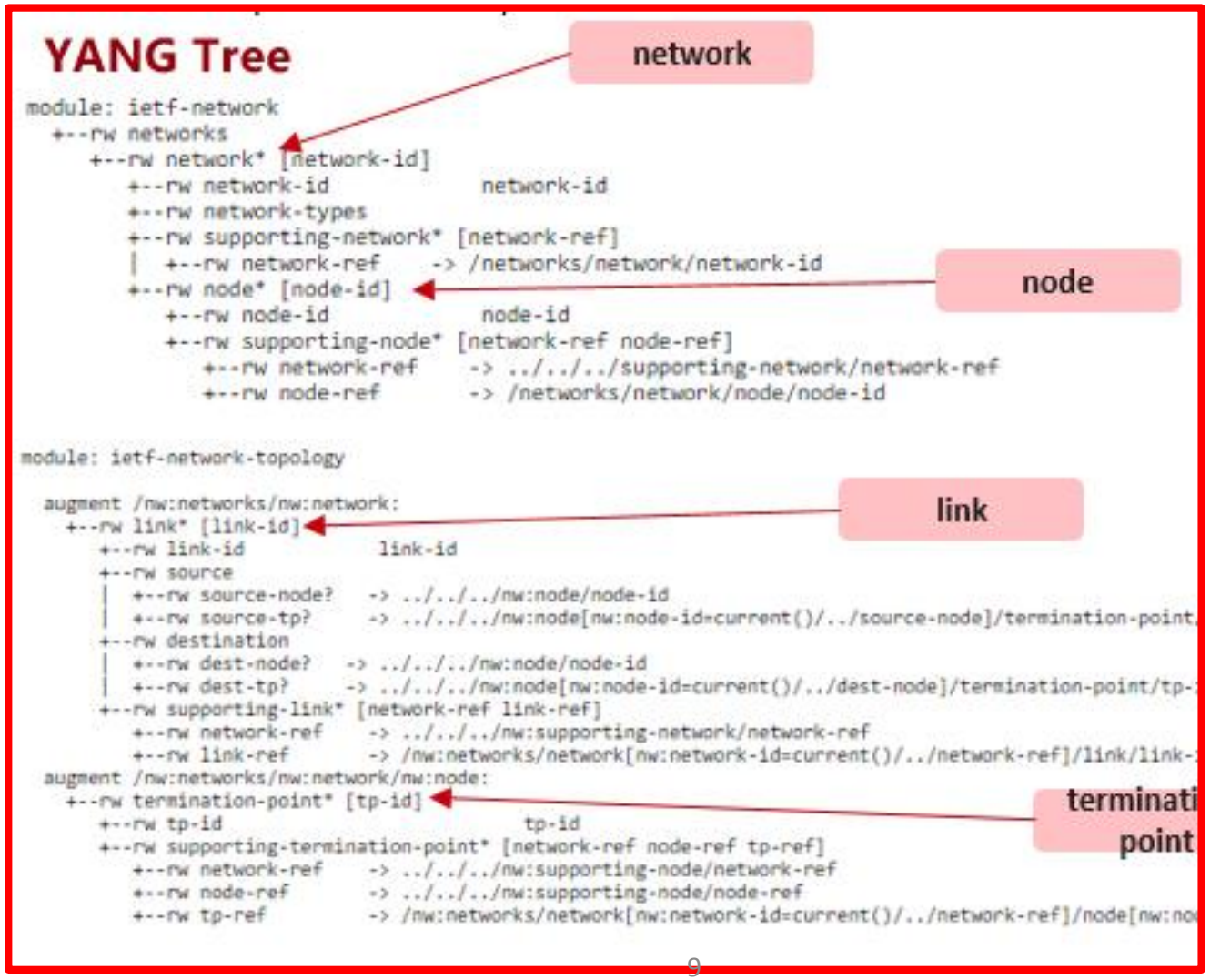
Implemented the IS-IS and OSPF using the drafts:
draft-ogondio-opsawg-isis-topology
draft-ogondio-opsawg-ospf-topology
Identified the limitations

- We need additional supporting relationships (TP->Node, Node->Network)
- Relationship Properties
- Termination Point Roles
- Layers / Sublayers
- Tunnels and Paths. Further analysis for RFC8345 versus RFC8795

IVY and Digital Map Modeling Relationship? What is ietf-inventory-topology-mapping?



Common: the 4 basic concepts & keys



Charter: « Mapping the inventory models that will be produced by the WG into existing IETF models (e.g., ietf-network-topology) is also in scope. “

IVY and Digital Map Modeling Relationship?

IVY, According to my reading

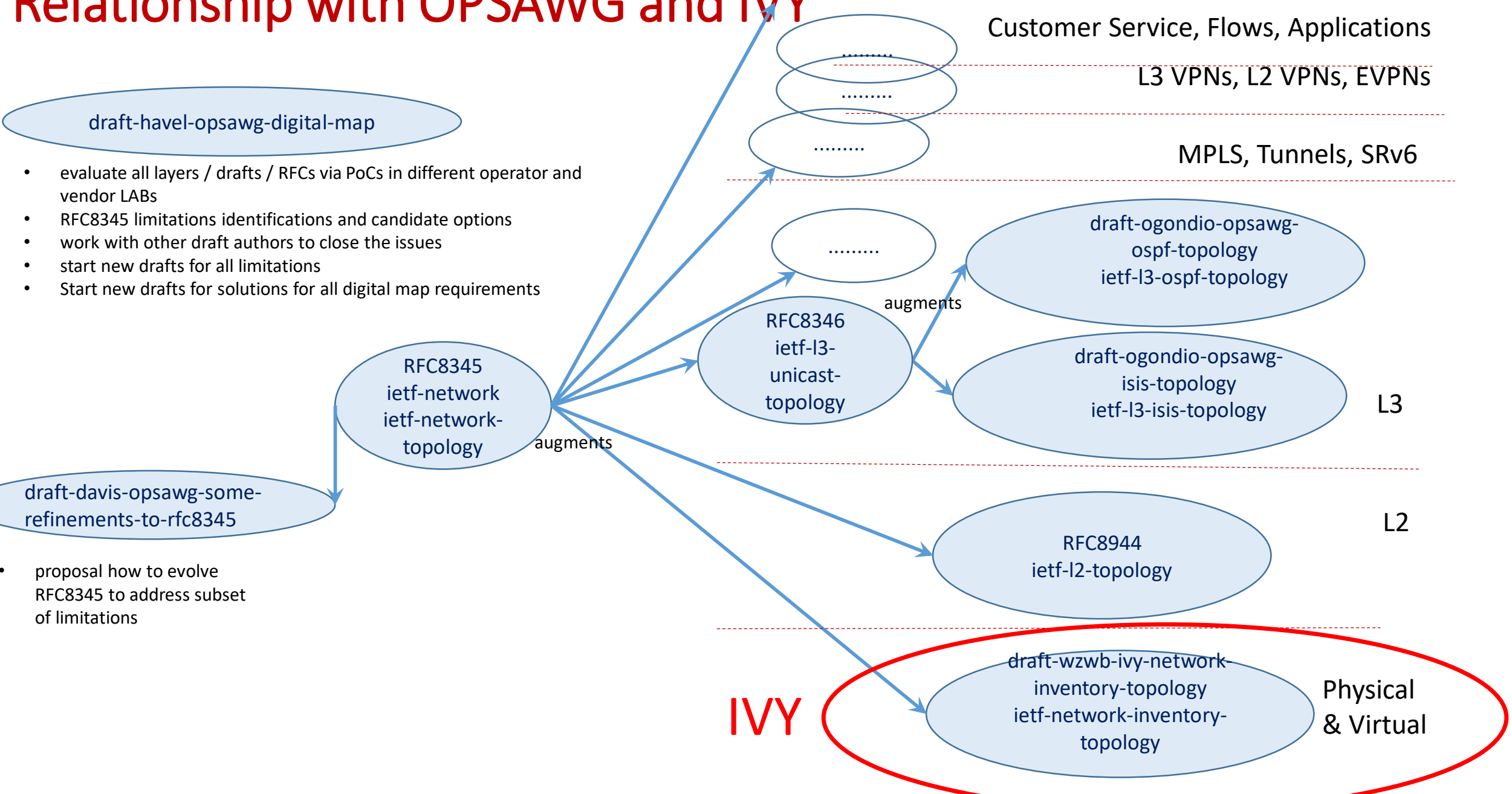
- The IVY effort focuses on the network inventory (as the charter says, "including a variety of information such as product name, vendor, product series, embedded software, and hardware/software versions").
- Network Inventory is about « assets »
  - Physical port, fiber, chassis
  - Note : could be virtual
- What is NOT about?
  - More than the bottom / asset layer => this is the scope of the digital map modelling aspect

Charter: « E. Mapping and correlation semantics: Correlating the inventory with existing IETF models e.g., topology, service attachment points (SAP), etc.”

=> I don’t understand SAP in there, inventory is not about service in this charter

=> SAP should not be in IVY

Relationship with OPSAWG and IVY



Comments ? Questions?