



SIMAP: Concepts, Requirements and Use Cases

[draft-ietf-nmop-simap-concept](#)

IETF 123 NMOP

21 July 2025

Madrid, Spain

**Authors: Olga Havel (presenting), Benoit Claise, Oscar Gonzalez de Dios, Thomas Graf
Nigel Davis (for modelling)**

Agenda

- draft-ietf-nmop-simap-concept
 - Quick SIMAP Refresh / Summary
 - Updates since IETF122
 - Closed issues since IETF122
 - What next for the draft
- What next for SIMAP
 - We started SIMAP modelling, [draft-havel-nmop-simap-yang](#) intro

draft-ietf-nmop-simap-concept (Refresh / Summary)

Expected contribution:

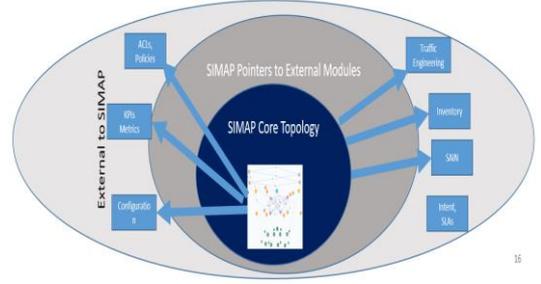
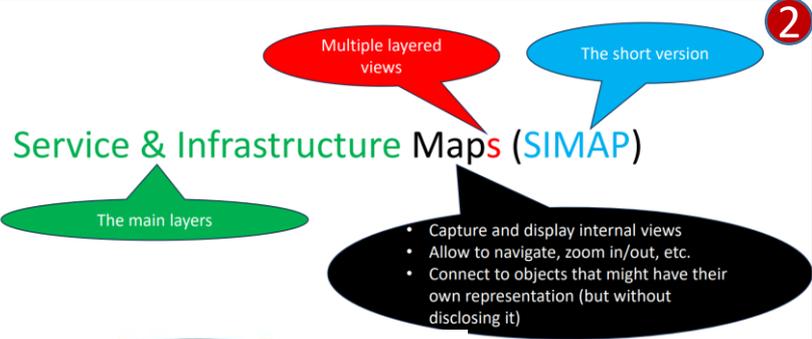
- 1 Have a *reference document* for the concept of SIMAP (previously known as Digital Map) independent of the modelling approach
- 2 Agree on *key related terms* and their definitions
- 3 Inventory of a *focused set of target use cases*
- 4 Identify *requirements* for solution design
- 5 Engage with Operators in *IETF Hackathons* to identify and validate requirements



SIMAP is a **data model** that provides a **view** of the **operator's networks and services**, including how it is **connected to other models/data** (e.g., inventory, observability sources, and operational knowledge).

It specifically provides an approach to model **multi-layered topology** and an appropriate mechanism to **navigate amongst layers** and **correlate** between them.

This includes layers from **physical topology to service topology**. This model is applicable to multiple domains (access, core, data centers, etc.) and technologies (Optical, IP, etc.).



- Other terms:**
- SIMAP modelling
 - SIMAP data
 - Topology
 - Multi-layered topology
 - Topology layer
 - Service

Therefore,

SIMAP defines the **core topological entities**, their **topological role** in the network, **core topological properties**, and **topological relationships** both inside each layer and between the layers.

It is a **basic topological model** with **references/pointers** to other models and **connects them all**: configuration, maintenance, assurance (KPIs, status, health, symptoms, etc.), traffic engineering, different behaviors, simulation, emulation, mathematical abstractions, AI algorithms, etc.

draft-ietf-nmop-simap-concept (Refresh)

Expected contribution:

- 1 Have a *reference document* for the concept of SIMAP (previously known as Digital Map) independent of the modelling approach
- 2 Agree on *key related terms* and their definitions
- 3 Inventory of a *focused set of target use cases*
- 4 Identify *requirements* for solution design
- 5 Engage with Operators in *IETF Hackathons* to identify and validate requirements

Operator Use Cases: 3

- ✓ Common Enablers for SIMAP:
 - ✓ Navigation Service -> Resource
 - ✓ Navigation Resource -> Service
 - ✓ Traffic Engineering (TE)
 - ✓ Closed Loop
- ✓ Inventory Queries
- ✓ Service Placement Feasibility Checks
- ✓ Intent/Service Assurance
- ✓ Service E2E and Per-Link KPIs
- ✓ Capacity Planning
- ✓ Network Design
- ✓ Network Simulation and Network Emulation
- ✓ Postmortem Replay
- ✓ Network Digital Twin (NDT)

Operator Requirements: 4

- ✓ REQ-BASIC-MODEL-SUPPORT
 - ✓ REQ-LAYERED-MODEL
 - ✓ REQ-PASSIVE-TOPO
 - ✓ REQ-PROG-OPEN-MODEL
 - ✓ REQ-STD-API-BASED
 - ✓ REQ-COMMON-APP
 - ✓ REQ-GRAPH-TRAVERSAL
 - ✓ REQ-TOPOLOGY-ABSTRACTION
 - ✓ REQ-LIVE
 - ✓ REQ-SNAPSHOT
 - ✓ REQ-POTENTIAL
 - ✓ REQ-SEMANTIC
 - ✓ REQ-LAYER-NAVIGATE
 - ✓ REQ-EXTENSIBLE
 - ✓ REQ-PLUGG
 - ✓ REQ-BIDIR
 - ✓ REQ-MULTI-POINT
 - ✓ REQ-MULTI-DOMAIN
 - ✓ REQ-SUBNETWORK
 - ✓ REQ-SHARED
 - ✓ REQ-SUPPORTING
 - ✓ REQ-STATUS
 - ✓ REQ-DATA-PLANE-FLOW
 - ✓ REQ-CONTROL-PLANE
- => Design Requirements
=> Architectural Requirements

Multi-Layered Topology - Layers/Technologies (IETF Hackathons – IETF120, IETF121, IETF122, IETF123, future) 5

- ✓ L1 Topology, including:
 - ✓ Optical
 - ✓ Active and Passive
- ✓ L2 Topology
- ✓ L3 Topology
- ✓ Control plane routing (underlay control plane correlatable to underlay L3 topology, overlay control plane correlatable to overlay L3 topology)
 - ✓ IGP (OSPF, IS-IS, iBGP)
 - ✓ eBGP
- ✓ Tunnels (MPLS-LDP, MPLS-TE, SRv6)
- ✓ L3VPN Service
- ✓ Application Flow / Data Flow

Updates Since IETF122 (Summary)

- 2 versions, v0.4 in June, v0.5 in July
- Editorial changes
- Updates around usage of SIMAP Model term
- All outstanding github open issues discussed on the mailing list and closed (11)
- 9 github pull requests, 42 github commits

Closed Issues Since IETF122 – All Issues Closed

- 13: Multi-layered topology versus topology hierarchy
- 15: Navigation across the abstraction levels inside a single network layer
- 21: termination point vs interface
- 22: Models to which the core SIMAP should navigate to
- 38: REQ-SEMANTIC – additional semantic needed, 2 new requirements added
- 58: Add example for REQ-DATA-PLANE-FLOW and REQ-CONTROL-PLANE
- 59: REQ-TOPO-ONLY change to link dynamic path
- 60: Updates to the Network Design Use Case
- 61: Use Cases are Related – do we need to regroup
- 62: REQ-PASSIVE-TOPO for current network
- 69: REQ-INTENDED - Based on the use case description, there is a need to have a requirement for intended topology as well.

What Next?

Is the document ready for submission to the WG Last Call?

All issues are closed and Working Group Milestone for IESG submission was June 2025

Work on Modelling/ Hackathons

- Engage more people in SIMAP modelling
- Discuss modelling options for all SIMAP requirements on the mailing list
- Implement at Hackathons

What Next? SIMAP Modelling (v00)

- Olga, Nigel, Benoit, Oscar and Thomas submitted the draft <https://datatracker.ietf.org/doc/draft-havel-nmop-simap-yang/00/>
- Although is 00, it's not new work. It replaces: [draft-havel-nmop-digital-map](#), [draft-havel-opsawg-digital-map](#), [draft-davis-nmop-some-refinements-to-rfc8345](#), [draft-davis-opsawg-some-refinements-to-rfc8345](#)
- Goal: start discussion on the NMOP mailing list about the best way to model each SIMAP requirement from draft-ietf-nmop-simap-concept not supported by RFC8345 and to engage more people
- The solution for the external relations (REQ-PLUGG) is proposed in a separate <https://datatracker.ietf.org/doc/draft-vivek-simap-external-relationship/>
- Anyone interested to get involved or to discuss any aspects, please contact any of the co-authors in Madrid.

What Next? Initial Modelling Approach (v00)

Initially done via RFC8345 augment just to focus on the modelling candidates and not where/what module they would be.

Candidate approaches:

- via new SIMAP YANG module, augmenting RFC8345 YANG modules.
- via RFC8345 bis YANG modules
- via new SIMAP model that does not augment RFC8345 YANG modules (either new YANG module or some other way).
- different approach for different groups of requirements.

What Next? Initial Table of Content for SIMAP Model Draft

- Introduction
- Why RFC8345 is a good approach for SIMAP Modelling
- Requirements Categorization (generic for all YANG, supported by RFC8345, RFC8345 gap)
- Modelling approach in this draft version
- API Scope (read for live and historical, read/write for potential and intended)
- Per SIMAP requirement identified as RFC8345 gap
 - modelling analysis
 - implementation proposal
- ietf-simap-topology YANG module
 - YANG module tree
 - the full YANG module

What next? YANG Tree and current status

```
module: ietf-simap-topology
+--ro networks-history
  +--ro network-history* [live-network-ref timestamp]
    +--ro live-network-ref -> /nw:networks/network/network-id
    +--ro timestamp       yang:date-and-time
    +--ro file-id?        inet:uri

augment /nw:networks/nw:network:
  +--rw name?           string
  +--rw label*          string
  +--rw description?    string
  +--ro extension?     <anydata>
augment /nw:networks/nw:network/nw:node:
  +--rw name?           string
  +--rw label*          string
  +--rw description?    string
  +--ro extension?     <anydata>
augment /nw:networks/nw:network/nw:node/nt:termination-point:
  +--rw name?           string
  +--rw label*          string
  +--rw description?    string
  +--ro extension?     <anydata>
augment /nw:networks/nw:network/nt:link:
  +--rw name?           string
  +--rw label*          string
  +--rw description?    string
  +--ro extension?     <anydata>
augment /nw:networks/nw:network:
  +--rw network-category? identityref
  +--rw live-network-ref? -> /nw:networks/network/network-id
  +--rw timestamp?      yang:date-and-time
augment /nw:networks/nw:network/nt:link:
  +--rw link-type?      identityref
  +--rw link-direction? identityref
  +--rw tp* [network-ref node-ref tp-ref]
    +--rw tp-ref        -> /nw:networks/
network[nw:network-id=current()]/../network-ref/
node[nw:node-id=current()]/../node-ref/nt:termination-point/tp-id
  +--rw node-ref        -> /nw:networks/
network[nw:network-id=current()]/../network-ref/node/node-id
  +--rw network-ref     -> /nw:networks/network/network-id
  +--rw tp-role?        identityref
  +--rw tp-direction?  identityref
augment /nw:networks/nw:network:
  +--rw subnetwork* [network-ref]
    +--rw network-ref   -> /nw:networks/network/network-id
```

Figure 12: The Structure of the SIMAP Data Model

Some initial modelling proposals for the following requirements (to start the discussion):

- REQ-GRAPH-TRAVERSAL: Graph Traversal
- REQ-SNAPSHOT: Different snapshots
- REQ-POTENTIAL: Potential new network topology
- REQ-INTENDED: Intended topology
- REQ-EXTENSIBLE: Extensible via metadata
- REQ-PLUGG: Pluggable (proposed in a separate draft draft-nmop-vivek-simap-external-relationship)
- REQ-BIDIR: Bidirectional Links
- REQ-MULTI-POINT: Multipoint Links
- REQ-MULTI-DOMAIN: Multi-domain Links
- REQ-SUBNETWORK: Subnetworks and partitioning
- REQ-PROPERTIES: Properties significant for topology

Comments, Questions?

Anyone interested to get involved or to discuss any aspects, please contact any of the co-authors in Madrid.