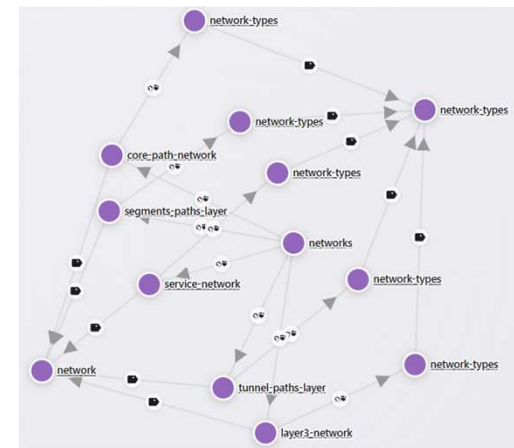# Knowledge Graphs For Network Operations

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Lionel Tailhardat lionel.tailhardat@orange.com

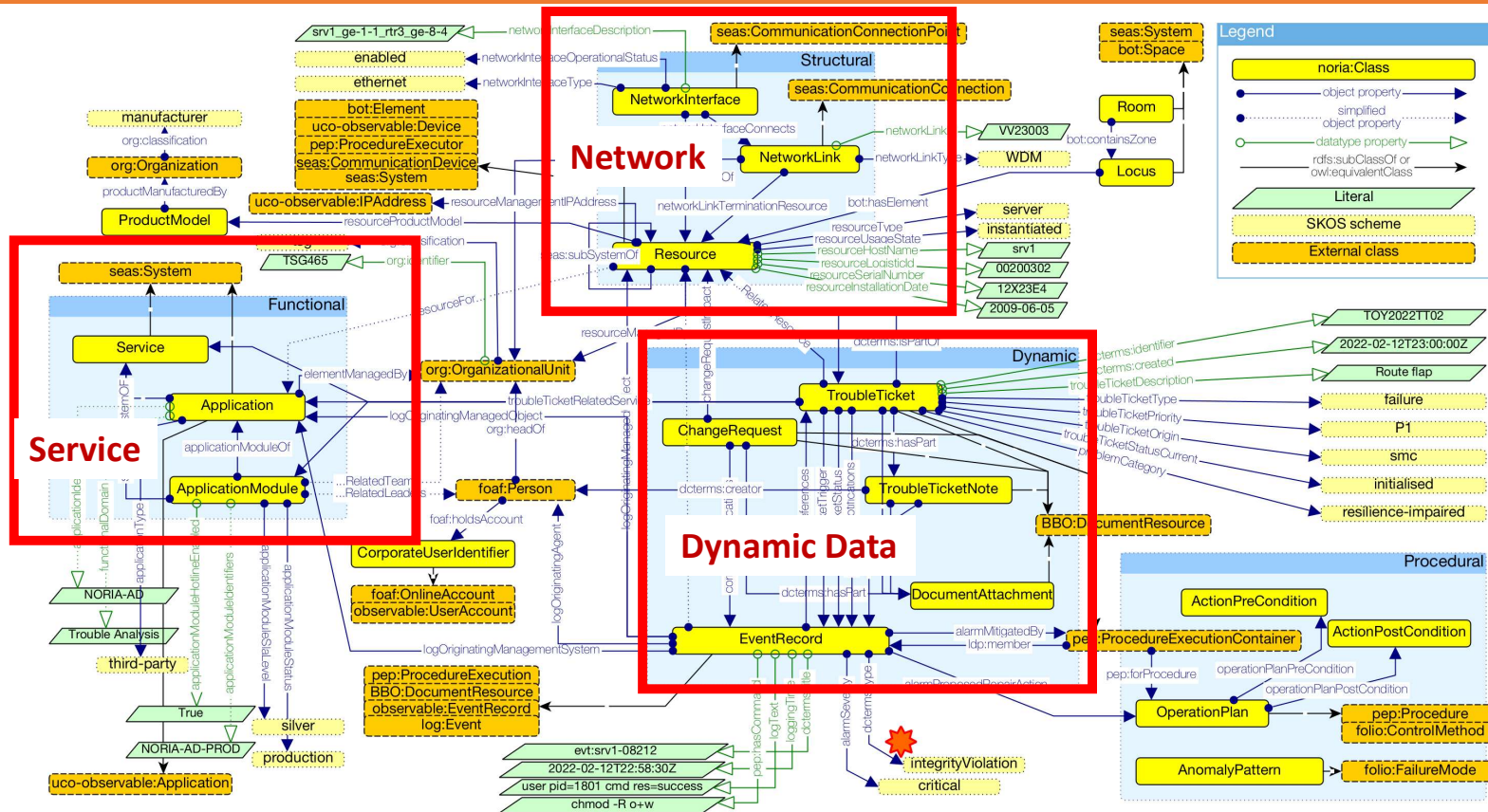FOLZ Pauline pauline.folz@orange.com

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What Were We Trying To Do ?

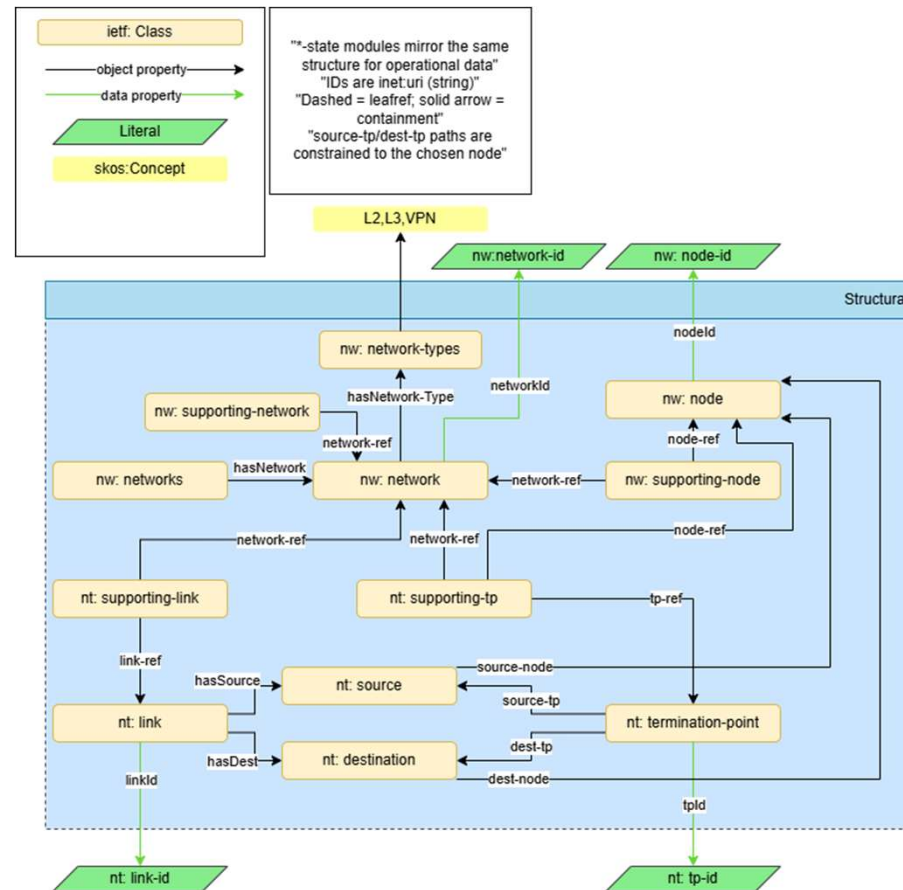**Output from the Knowledge Graph (NMOP) – IETF 123 (Madrid) Interim Meeting:**

> *"Create an initial PoC, fusing the (early) SIMAP model with the NORIA-O incident model to illustrate how existing work with IETF can be quickly integrated into an existing ontology and extended with new knowledge."*
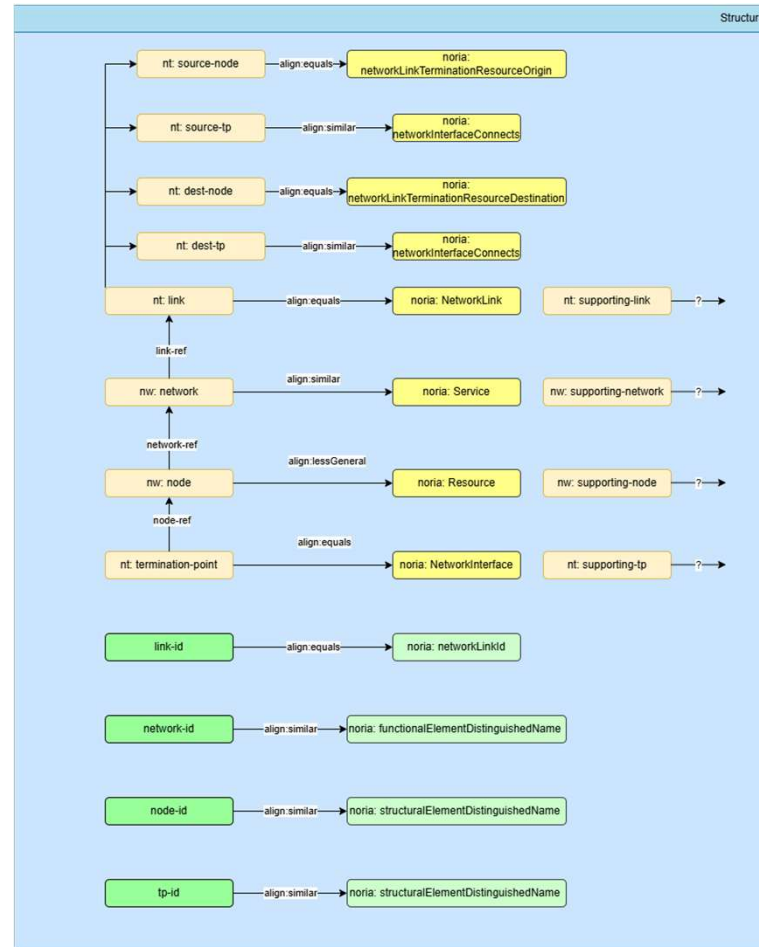
NORIA Ontology

SIMAP RDFS Model Diagram

Converted from SIMAP YANG Files defined in:
https://datatracker.ietf.org/doc/draft-havel-nmop-simap-yang/
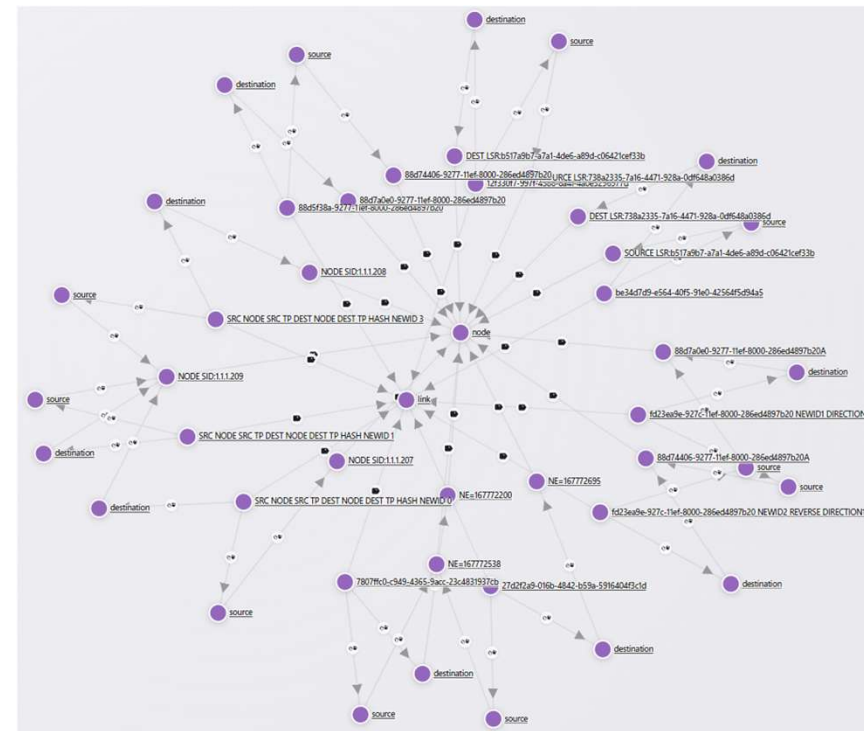
Mapping/Alignment From NORIA Ontology To SIMAP

What Can We Do ?

Query Relationship information in SIMAP

All Links connected to Nodes through
Source/Destination

```
CONSTRUCT {
  ?link a <http://www.huawei.com/ontology/ietf-network/networks/network/link> ;
        <http://www.huawei.com/ontology/ietf-network/networks/network/link/hasSource> ?src ;
        <http://www.huawei.com/ontology/ietf-network/networks/network/link/hasDest>    ?dst .
  ?src <http://www.huawei.com/ontology/ietf-network/networks/network/link/source/source-node> ?sn .
  ?dst <http://www.huawei.com/ontology/ietf-network/networks/network/link/destination/dest-node> ?dn .
  ?sn a <http://www.huawei.com/ontology/ietf-network/networks/network/node> .
  ?dn a <http://www.huawei.com/ontology/ietf-network/networks/network/node> .
}
WHERE {
  ?link a <http://www.huawei.com/ontology/ietf-network/networks/network/link> .
  OPTIONAL { ?link <http://www.huawei.com/ontology/ietf-network/networks/network/link/hasSource> ?src .
            OPTIONAL { ?src <http://www.huawei.com/ontology/ietf-
network/networks/network/link/source/source-node> ?sn . } }
  OPTIONAL { ?link <http://www.huawei.com/ontology/ietf-network/networks/network/link/hasDest>    ?dst .
            OPTIONAL { ?dst <http://www.huawei.com/ontology/ietf-
network/networks/network/link/destination/dest-node> ?dn . } }
}
LIMIT 100
```
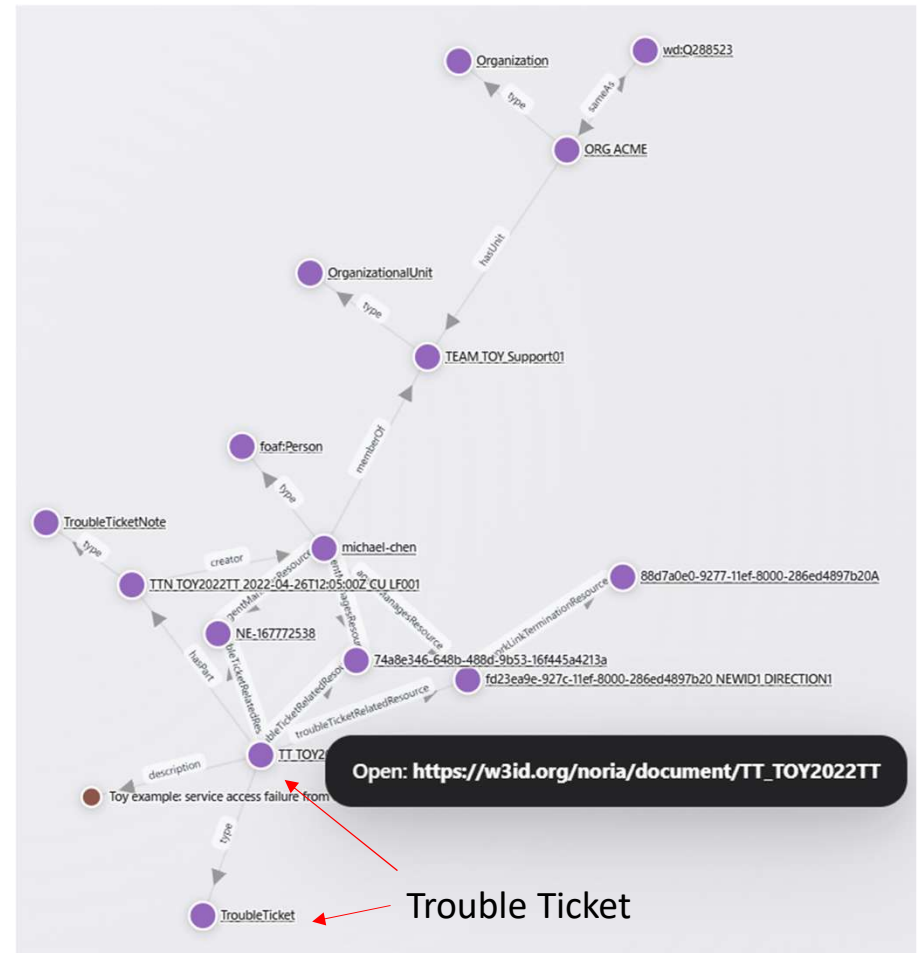
What Can We Do ?

Link IETF data With Data From OSS/BSS

A problem occurs on the network,
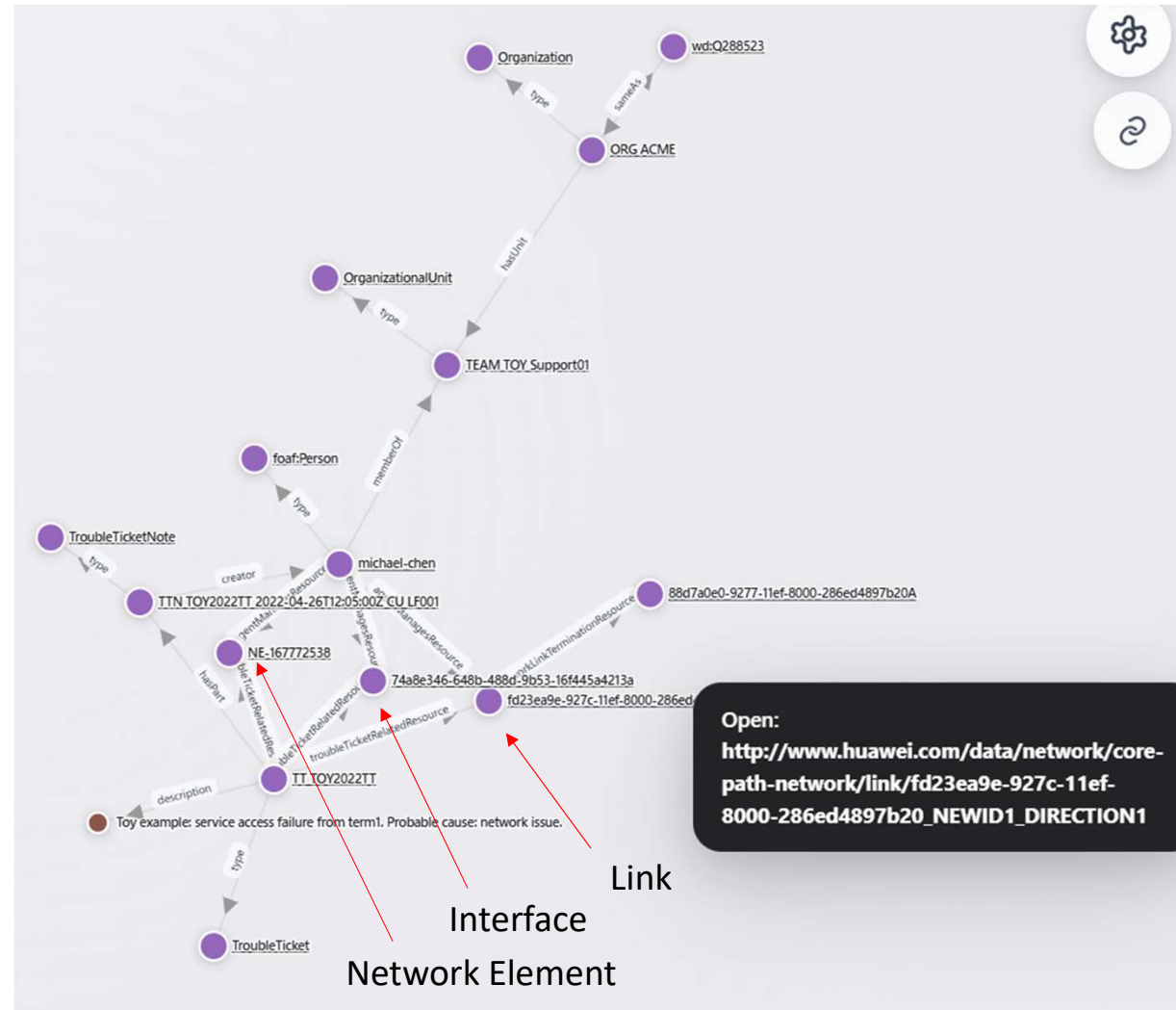A trouble ticket is created

Trouble Ticket

What Can We Do ?

Link IETF data With Data From OSS/BSS
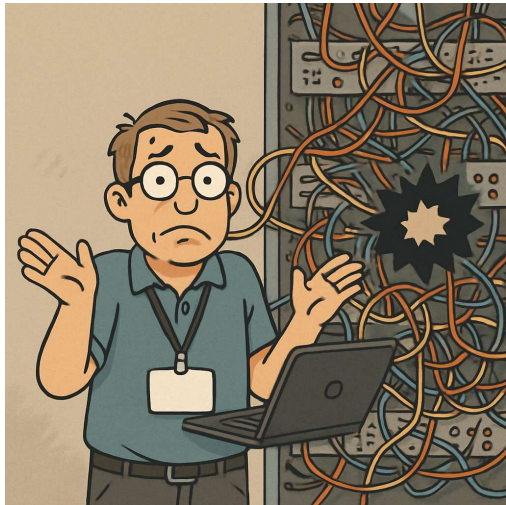

NETWORK TOPOLOGY

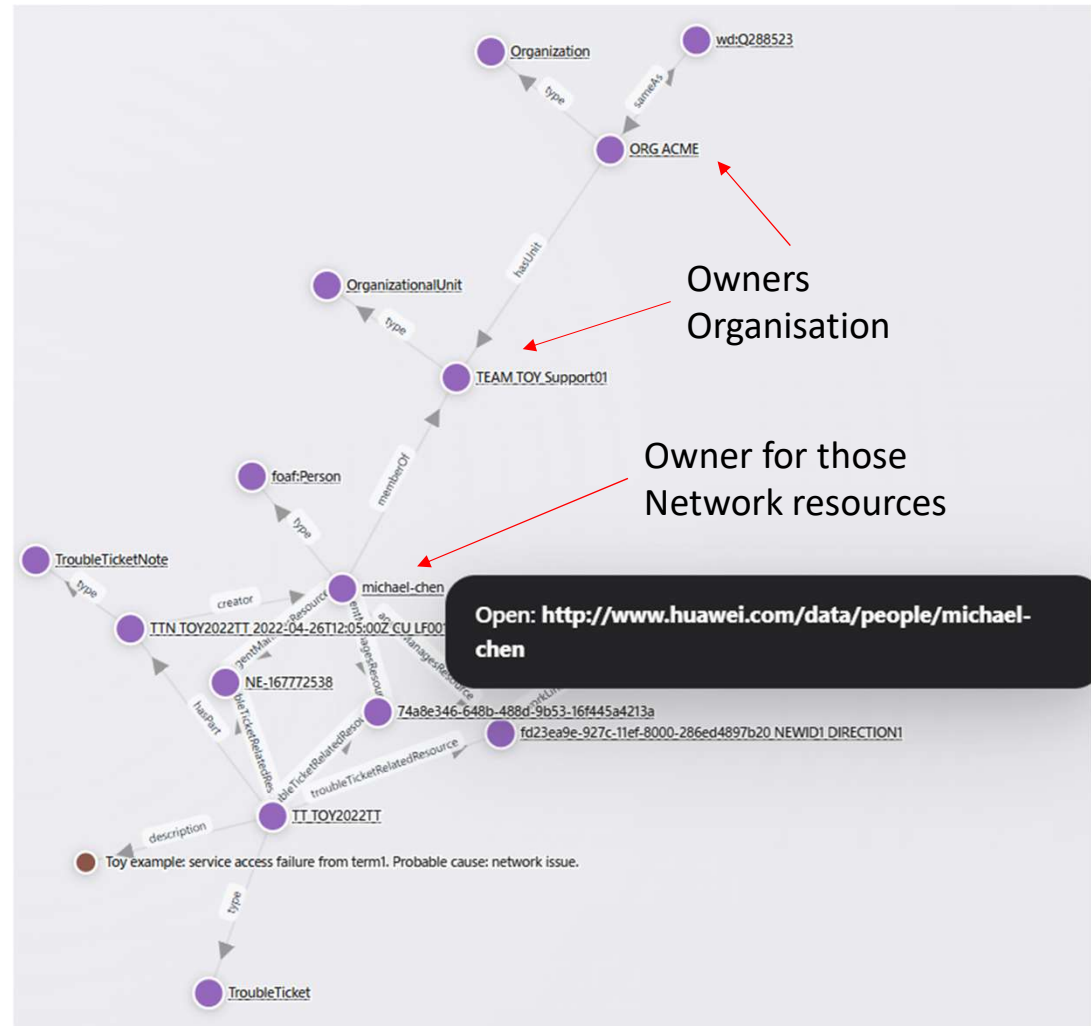Investigation links the trouble ticket with a particular Network Element, Interface and Link

What Can We Do ?

Link IETF data With Data From OSS/BSS

The Contact for that part of the network is identified.

Owners Organisation

Owner for those Network resources

Open: http://www.huawei.com/data/people/michael-chen

Next Steps:

Setting up an **exploration test bench** using predefined graph traversal queries on a shared graph instance

More Discussion On Wednesday At NMOP (2.30pm)

In the meantime, please check out our drafts

https://datatracker.ietf.org/doc/draft-mackey-nmop-kg-for-netops/
https://datatracker.ietf.org/doc/draft-tailhardat-nmop-incident-management-noria/
https://datatracker.ietf.org/doc/draft-marcas-nmop-kg-construct/

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