Topology Exchange and Path Finding

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General remarks

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We present the topology exchange solution that supports

- different topology representations (NML example)
- different (optimal) path-finding algorithms are supported for given topology
- (finding of) disjoint paths
- security (not discussed here)
- topology provisioning based on on
  - requesting party
  - bilateral peering agreement
  - other policies

Components

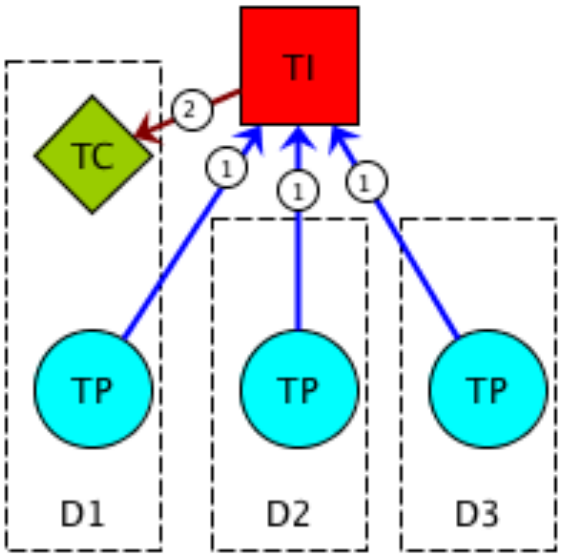
We distinguish three main components, they can be combined into services.

- **Topology Index** tells you the location of the served topologies
- **Topology Provider** serves the topology files.
- **Topology Consumer** processes the topology information
  - Examples: Lookup service, Path finder service, Monitoring service, Validation service

Considerations

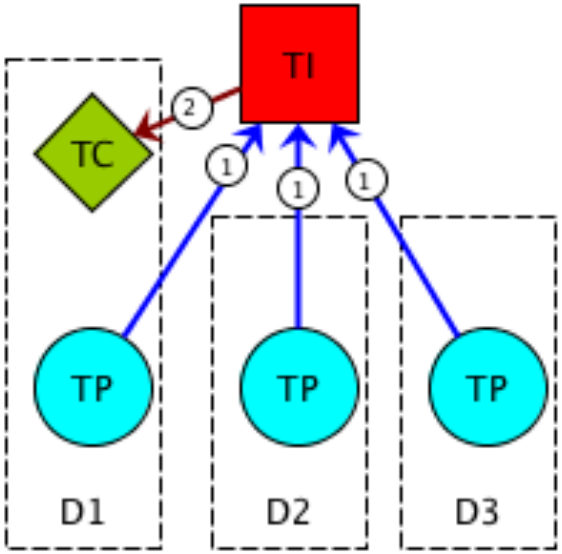
- the **topology index** is never the true source of information, those are the topology providers
- the **topology provider** deals directly with the consumer and decides what to show or what exceptions to make based on local policy
- the **topology consumer** decides what to do with the given information and what is relevant for it to work
- (signed topology updates and encrypted connections)

Topology Distribution 1



1. Topology provider sends an update to the index
2. Topology index notifies the subscribed topology consumers (clients)

Topology Distribution 2

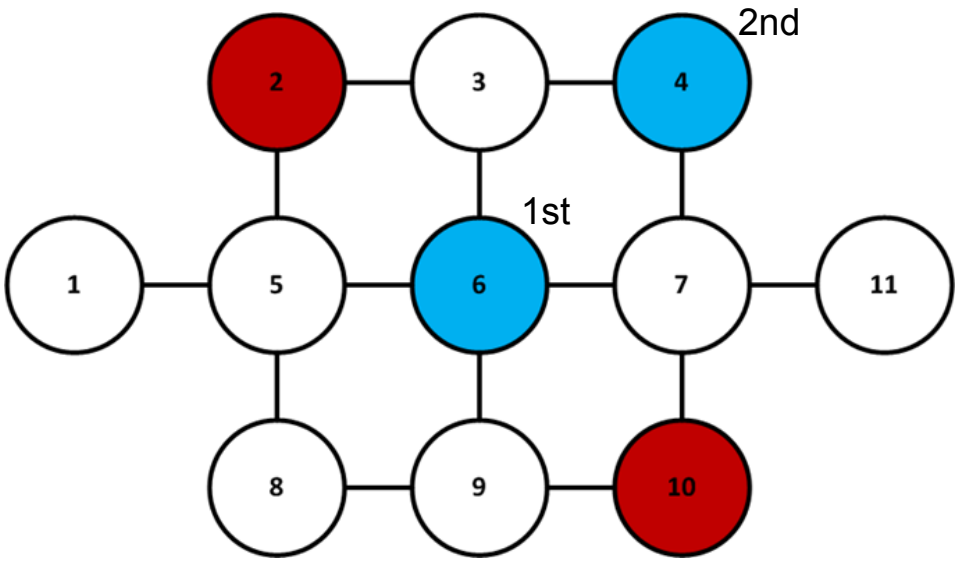


1. The topology consumer (client) fetches the summary information from the topology index
2. TC obtains the topologies from respective providers

Path finding

- The multi-domain routing algorithm
  - needs to accept more path requirement details
  - provides an inter-domain path that satisfies the given requirements
  - Inter-domain links may be described using many attributes
  - Multi-constrained (optimal) path problem
  - May or may not support loops

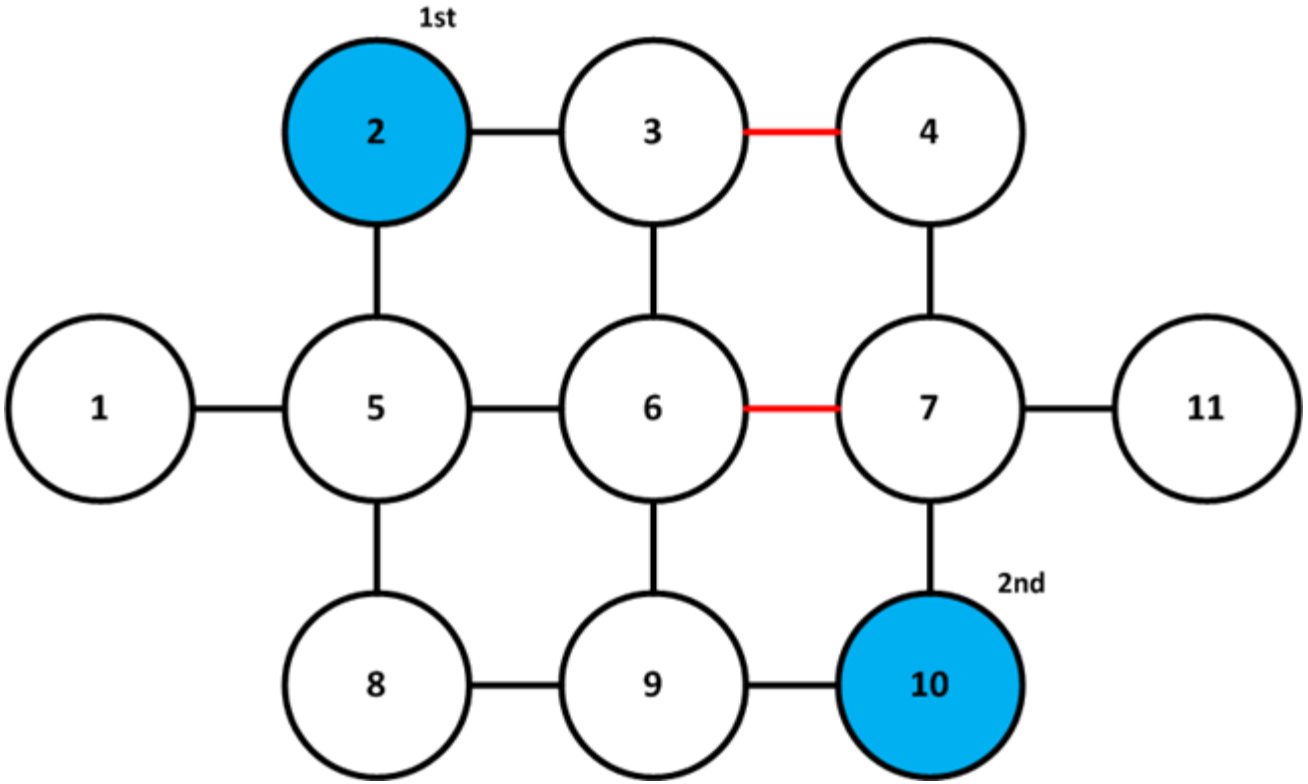
Path requirements



For an inter-domain (ID) path the following requirements may be specified

1. Certain domains must (or must not) belong to the ID path
2. Certain domains or ID links must be in a predefined sequence
3. Certain ID links must (or must not) belong to the ID path

Example



Find the shortest inter-domain path from domain 1 to domain 11, "not-via" inter-domain links (3,4) and (6,7), and "in-order" domains 2,10. (1-5-2-3-6-9-10-7-11)

Questions?

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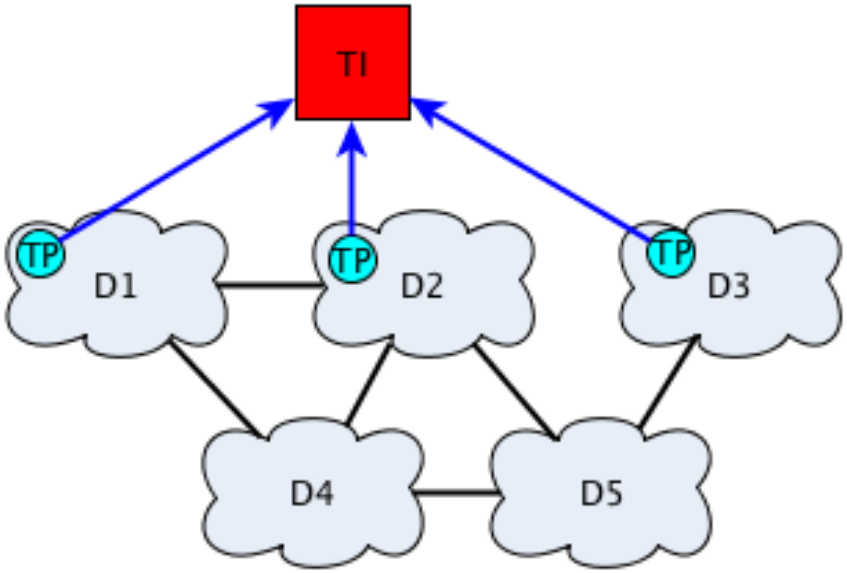
- Freek Dijkstra, Diederik Vandevenne (SURFsara)
- Hans Trompert, Gerben van Malenstein (SURFnet)

Thank you!

Index format



domain	version	location	neighbours	foreign
D1	01	http://d1.net/topo/	D2	D4
D2	01	http://d2.net/topo/	D1	D4, D5
D3	01	http://d2.net/topo/		D5

Security concerns

We use public key techniques to validate topology information

- Topologies and topology updates are signed by the TP
- Index information is signed by the TI

Public keys have to be known by all parties we can do this by:

- Distributing public keys via a PKI
- Managing the topology index, adding domains and keys manually
- Use DNS to distribute keys and DNSSec to sign