



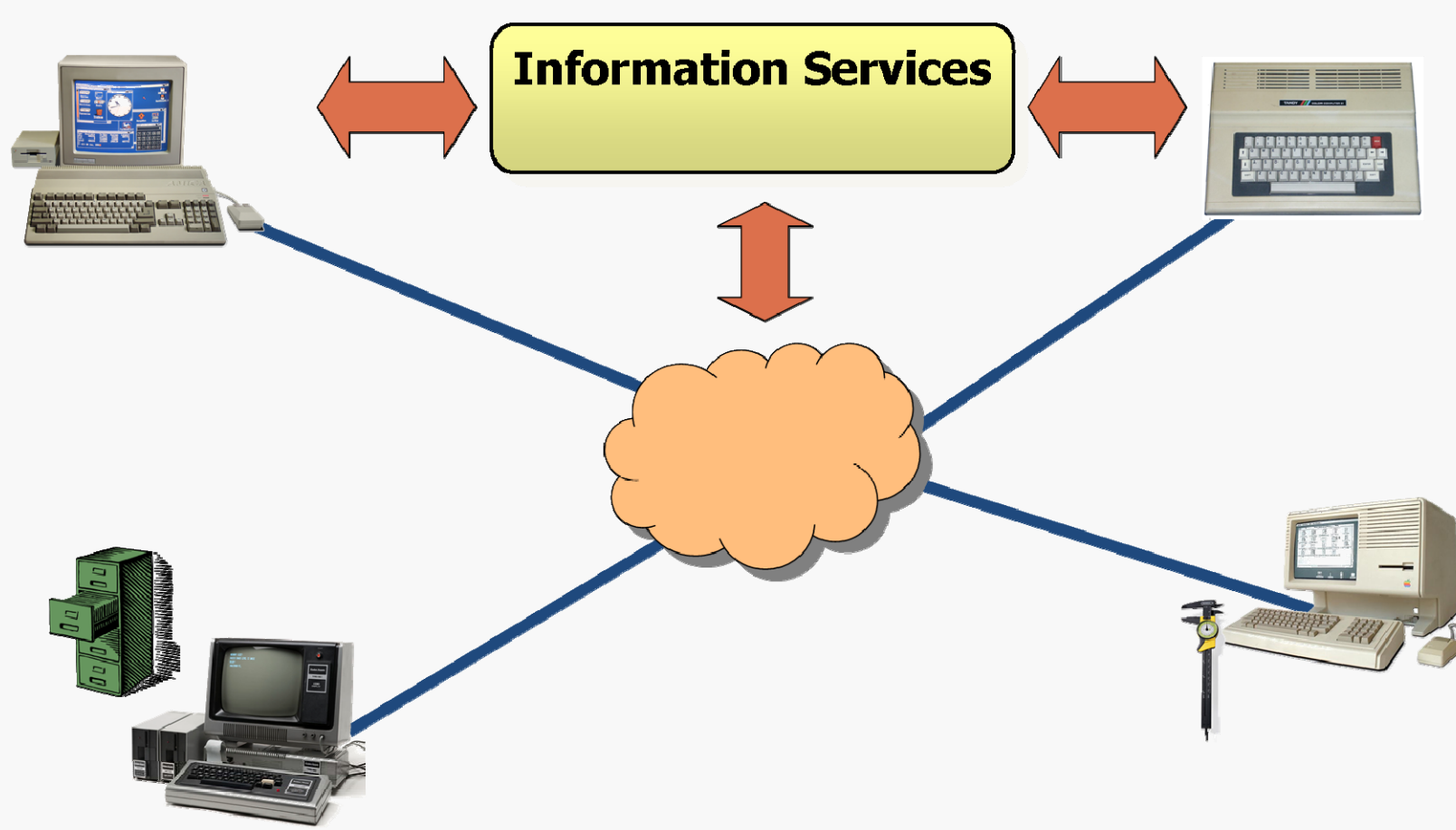
# Unified Network Information Services (UNIS) allow users to discover network services and capabilities

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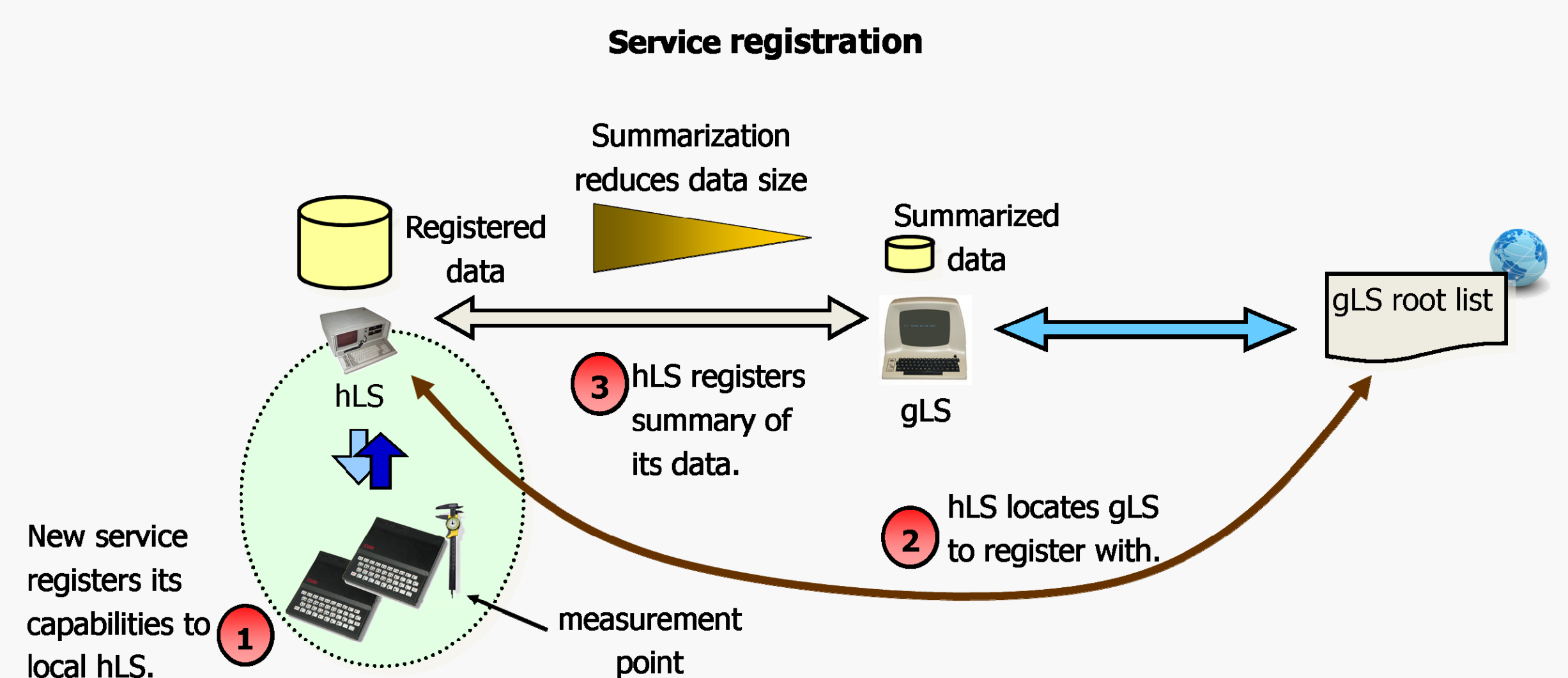
## UNIS is an Information Services Plane

- Distributed software architectures use the Information Services plane to discover “meta” information within the network.
- This information services plane facilitates discovery of network topology, location, and capabilities of network services.
- It is used in:
  - Performance measurement infrastructures (perfSONAR);
  - Dynamic circuit networks (ESnet SDN, Internet2 DCN, ION, GÉANT AutoBAHN);
  - Experimental infrastructures (GENI).
- Information Services Working Group (IS-WG) targets defining functionalities of the information services plane, and driving design and development.



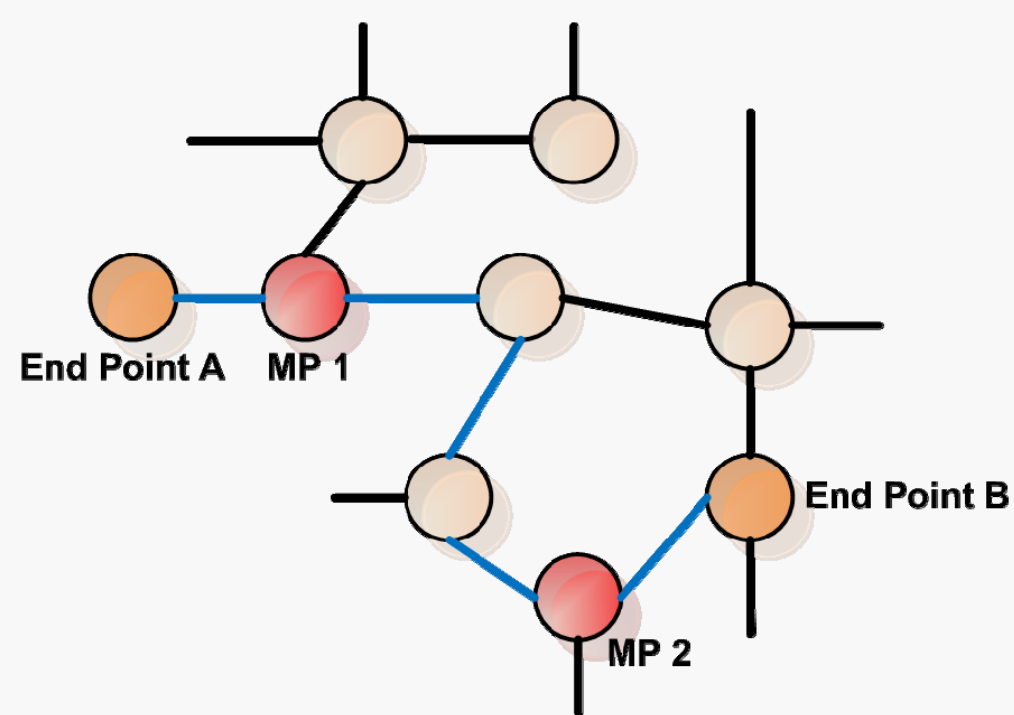
## Lookup Service conveys a distributed directory for services

- The Lookup Service (LS) within UNIS is a distributed directory, composed of levels.
  - Local directories (hLS): point to local services (measurement tools, archives).
  - Global directories (gLS) of local directories (all gLSs are synchronized).
- The hLS accepts registrations from services.
- hLSs combine registration information into single *summaries*.
- hLSs sends *summarized* data to gLSs.
- gLSs share information among other gLSs, and offer complete coverage.
- Clients consult hLS/gLS to discover services.
- Clients and services will use well-known API for communication.

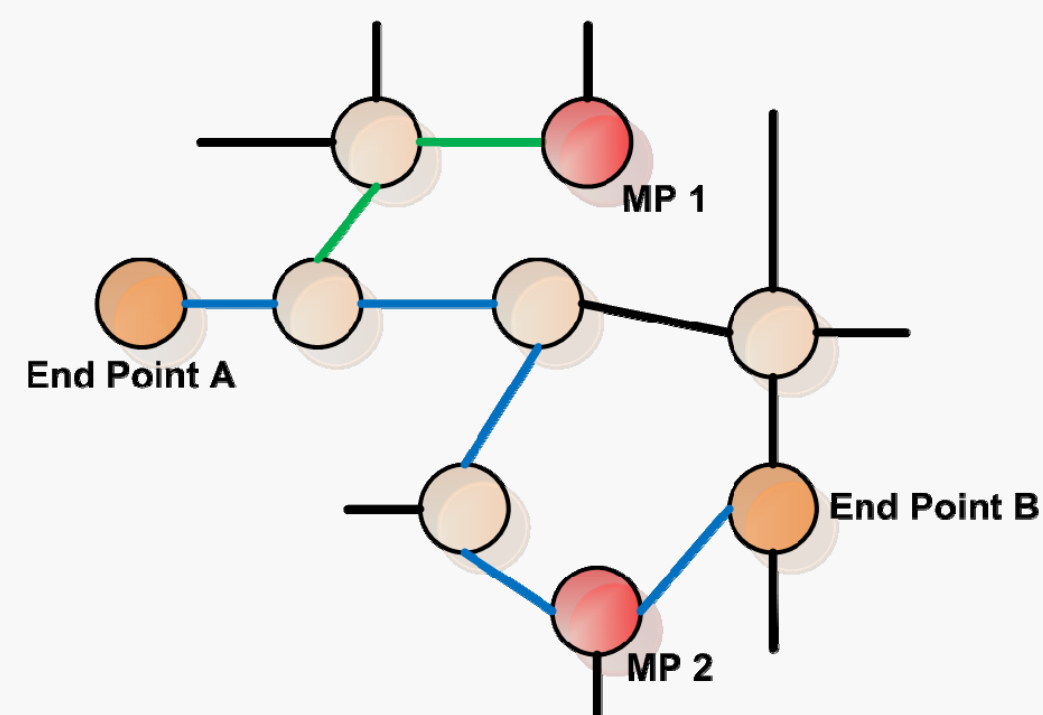


## Find the closest Measurement Point

- In a network measurement infrastructure (e.g., perfSONAR);
- Measurement Points (MPs) are devices responsible for running tools to collect measurement data.
- One or more MPs are activated to conduct measurement.
- The MPs might lie totally *inside* the path between end points, or *outside* the path.
- Appropriate located MPs must be chosen to obtain “good” measurements;
  - typically, the MP closer to the end point in topology.
- The Related MP service within UNIS facilitates discovery of MPs and their location in topology.

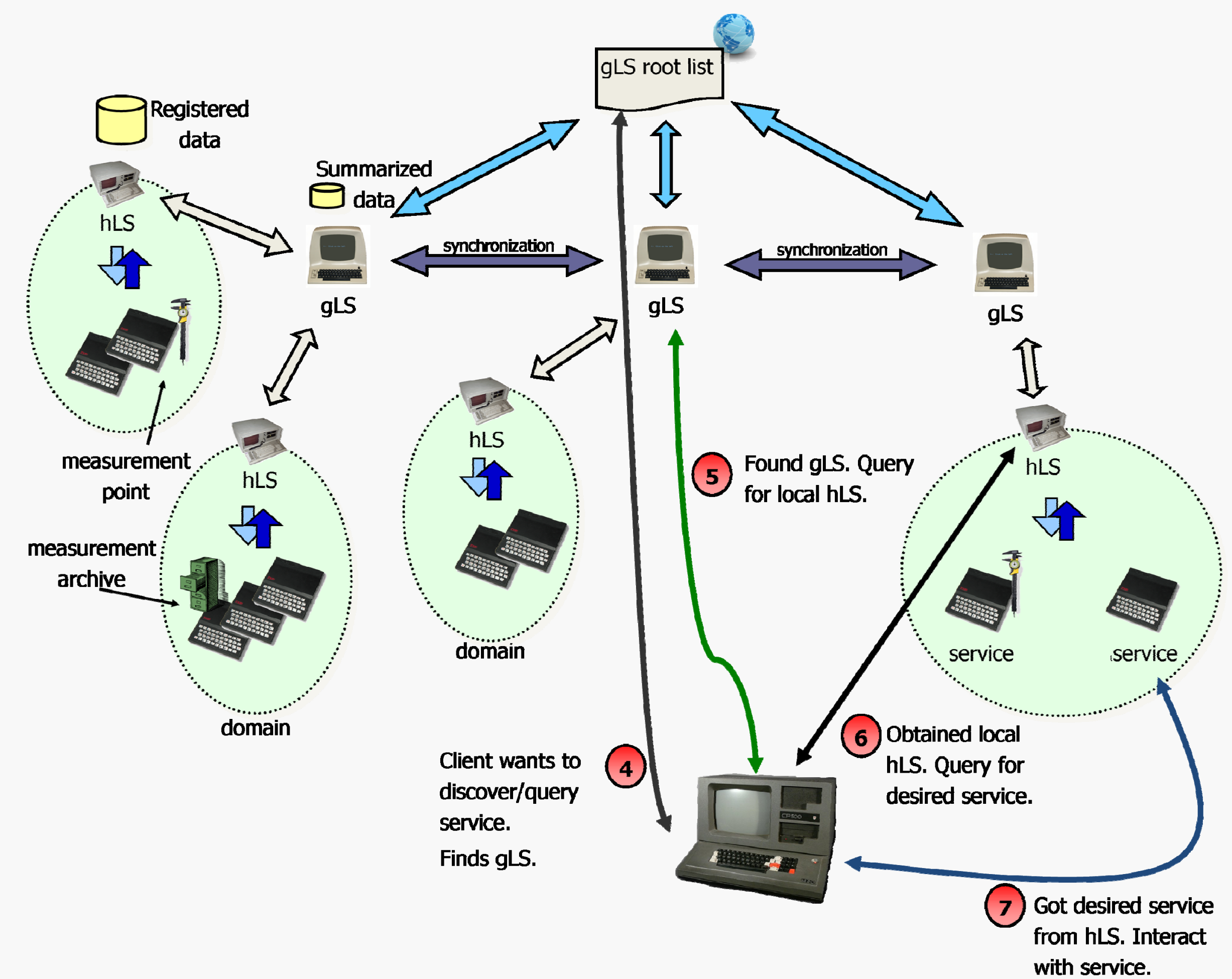


Example topology where MPs lie within a path (blue) connecting end points.

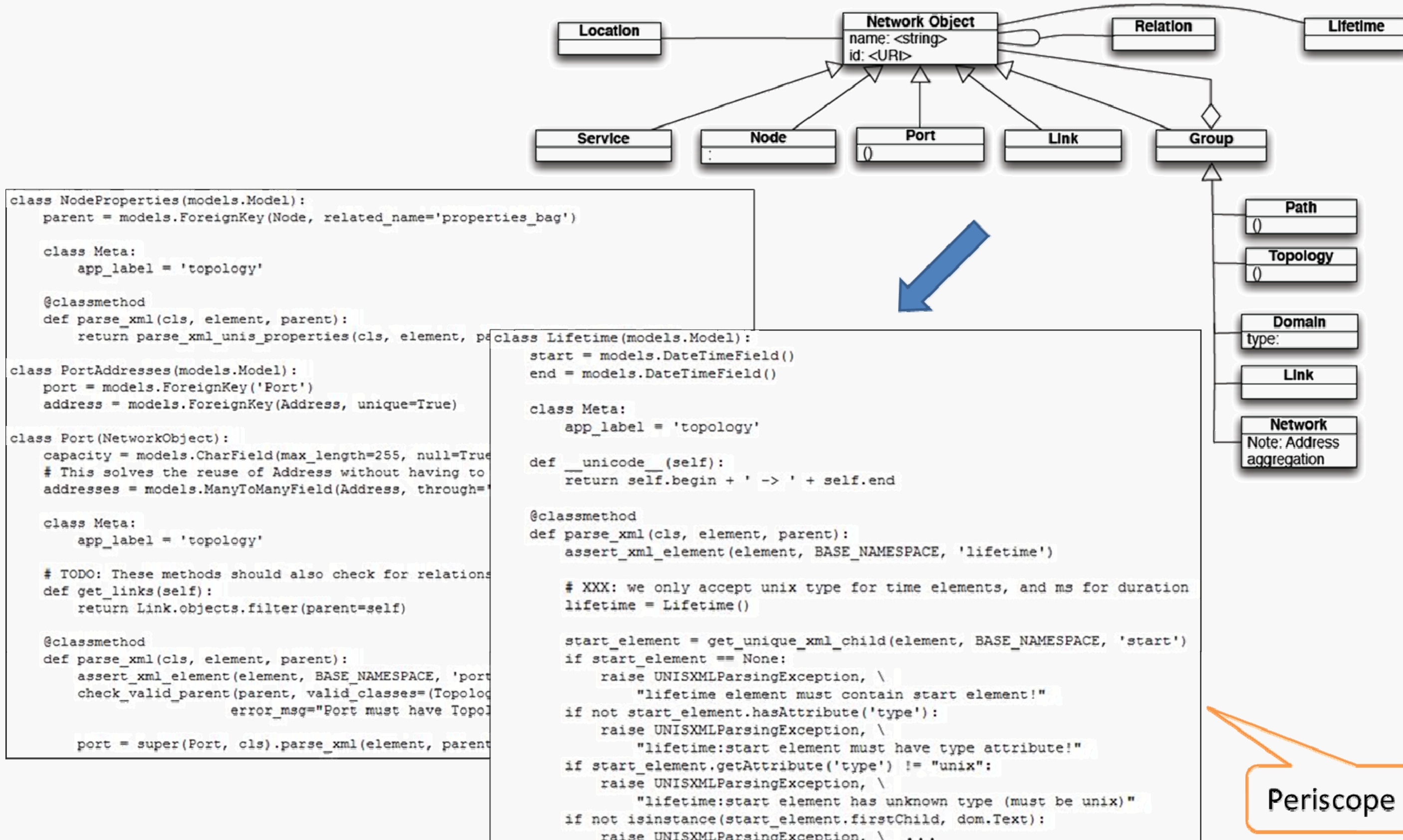


Example topology where one MP lies outside a path (blue) connecting end points.

## Service discovery



## Normalizing diverse topology schemas



Periscope Model

- Distinct infrastructures may have their own schemas that represent topology elements.
  - TeraPaths
  - GENI's RSpec
  - perfSONAR's UNIS
- Our Periscope visualization tool is capable of normalizing distinct topology schemas into the UNIS schema.
- In perfSONAR, schemas based on NML-WG (Network Mark-up Language Working Group) definitions are used to specify XML messages format to interact with perfSONAR services.
- The Django MVC is used to represent UNIS and measurement data within Periscope.
- Topological elements, from links and ports to domains and networks, are cleanly modeled and mapped to measurement data.
- Periscope may also translate general network models to UNIS.