perfSONAR (PERformance Service Oriented Network monitoring Architecture)
• Services-oriented infrastructure for network performance monitoring.
The Lookup Service is a directory service within perfSONAR. Composed mainly by:
• hLS: local directory of local services (measurement tools, measurement archives, etc.);
• gLS: global directory of local directories.

When a client wants to find available services regarding some network:
• Client queries gLS;
• gLS informs which hLS controls the desired network;
• Client queries the hLS and receives list of services in that network.

For this scheme to work, each hLS must periodically publish their directories to the gLS.
But publishing the entire content of the directories may result in network overload and demand excessive resources from the gLS.

hLSs then summarize their directory data before publishing to avoid pushing large amounts of data into the network, and to optimize gLS resources and query time.
Specifically for IP addresses, our heuristic accomplishes summarization by employing IP subnet addresses to represent the actual host IP addresses controlled by a hLS.
The heuristic constructs a special data structure – a PATRICIA tree – within which the inner nodes are the subnet addresses, and the leaves, the actual host IP addresses.

The heuristic uses three metrics to decide which inner nodes to pick:
• Distance: notion of how many IPs a subnet claims, but do not actually exist in the network;
• Density: number of actual IP addresses over total number of possible IPs in a subnet;
• Minimum Subnet Mask: avoids too large subnets.
The heuristic uses the metrics and tries to select subnets that do not summarize too much (imagine 0.0.0.0, that represents all possible IPv4 addresses), or summarize too few (less compression efficiency).
After the heuristic selects the summarizing nodes, the hLS publishes the compressed directory data. The gLS can perform optimized queries and better manage storage space.

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