

Service Specific Overlay Networks Setup and Maintenance using Pattern-based Management*

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Service specific overlays are overlay networks build and setup for a single service. Since different services need different types of overlays, the setup process is pretty different. Current approaches normally allow a customer to send in an overlay specification into the overlay provisioning system (mainly centralized). In our approach, we use pattern-based management in order to run the process completely distributed, but still having a basic communication pattern to be reused for other overlays with different requirement. In this talk, we present the concept and a first implementation on the SIMPSON pattern simulator.

Problem statement: Given a source node and a set of destinations, setup an SSON (Service Specific Overlay Network) based on an overlay network specification. The specification will state the number and type of functions required between the source and each destination node as well as the preferred position of the functions with respect to the source and destination.

Terminology: *Source node* (Initiator): A node which has knowledge about the requirement of the SSON, *Destination node*: A representative node to a set of destination nodes. A *potential overlay node*: A node which has the set of functions needed by the SSON.

Approach: The steps in the whole process of setting up a SSON consist of

1. Detecting potential overlay nodes: Only a subset of all overlay nodes is capable of hosting a virtual node from a SSON. Those able to host have the specified functionality and resources available.
2. Selecting suitable nodes: Only those nodes, which are at the right locations on overlay paths (based on specification of the overlay), are suitable and a certain optimization of the overlay under specification constraints might be possible.
3. Setting up the overlay network: After selecting the nodes, they need to get configured accordingly, additionally, the virtual link need to get configured.
4. Client joining SSON: Given a new client wants to join the overlay network, it needs to search the nearest node of that overlay, where nearest can be specified in various metrics. E.g., the metric can be hop count, resources availability on the virtual link.
5. Maintenance: Since the network is assumed to be dynamic, and clients are coming, going and moving around, the overlay might need to get changed to still fit the specification.
6. Security: We believe that the most important security issues in the overlay network setup process are the following: Protect the expansion of a search initiated by a non

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authorized node. Try to avoid aggregating a search result from a non authorized node. Protect against false reconfiguration request.