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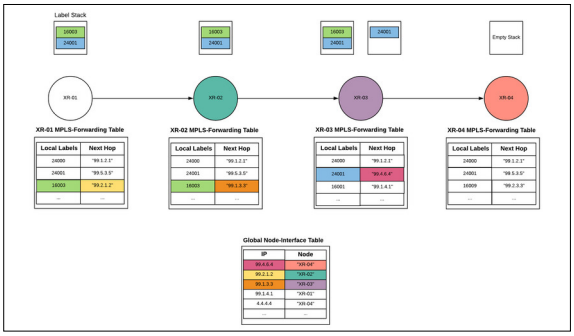
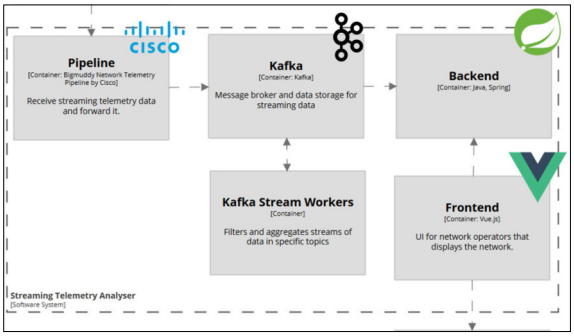
Themengebiet	Software
Projektpartner	Cisco Schweiz

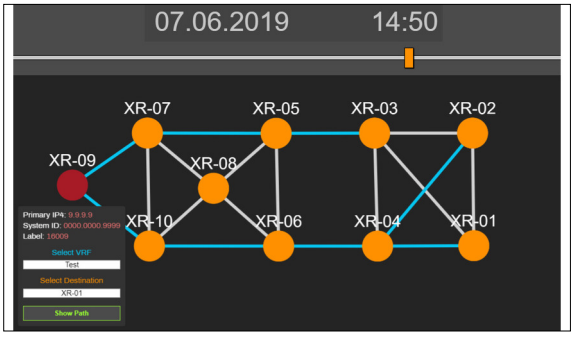
Real-time analytics in the network



Segment Routing overview
Eigene Darstellung



Architecture
Eigene Darstellung



Application that shows all paths within the "Test" VRFs (blue) before the specific path to router "XR-01" is choosen.
Eigene Darstellung

Einleitung: For a network operator it is crucial to see the routing of data packets through a network. With the introduction of new technologies like Segment Routing, the path taken in the network can depend on the service and its assigned requirements (e.g. QoS, bandwidth, etc.). A modern monitoring tool should be able to show those paths per service in a dynamic way.

Another technological innovation in the network area is Streaming Telemetry. It opens the door to near real-time monitoring of a network in a very efficient way since its using a push and not a pull model like SNMP does.

Vorgehen / Technologien: The developed application facilitates the management of any given network by providing a dynamic network topology that is displayed in a web browser. The required data from the routers is obtained with Streaming Telemetry. Streaming Telemetry is a network monitoring approach in which devices constantly send data. In this case, the virtual routers send data every 5 minutes to a Cisco software called Big Muddy Pipeline.

One important information is about the neighbors of each device. The routers are configured with the neighbor discovery protocol CDP. This information is required to create a network topology map that is displayed in the frontend afterwards.

Another essential feature is the visualization of different possible paths a router can send data packets through. This is made possible with Steaming Telemetry data from Segment Routing. With Segment Routing an application directs packets through an ordered list of instructions. The ordered list is called the "Label Stack" and the instructions are "Labels". A label dictates to which router the data is sent next. The sending router can look up up this information in its Multiprotocol Label Switching (MPLS)-Forwarding-Table. If the destination is reached, the next label on the label stack is processed until the label stack is empty.

Ergebnis: The application developed in this thesis is based on an existing prototype which has been adapted and extended with additional features. Although the prototype presented a good base, some existing features needed to be improved or altered due to the changes in technology and data.

The resulting web application dynamically visualizes a network topology. The nodes of this network represent routers, that upon clicking, reveal more detailed information. The application visualizes possible and actual segment routing paths taken between two nodes within a chosen service. The application also provides a history function, with which it is possible to search the history of the network topology. This enables the operator to see possible changes of the network at a given point in time.