Programmable Networks

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Project (part 2): Programmable Data Plane with P4

In this project you are asked to define a P4 program that instructs switches to perform packet forwarding according to the Service Function Chain (SFC) architecture, based on the Network Service Header (NSH).

With reference to the SFC architecture, you are asked to reproduce the Classifier (CL) and the Service Function Forwarder (SFF). As an example, let us consider the scenario reported in the figure below, showing an SFC domain connecting two hosts. The traffic generated by host H1 and directed to host H2 must be steered through two Service Functions (SFs, not shown in the figure): the first one is connected to the switch s3, while the second is accessible through the switch s5. The two switches then assume the role of SFFs.

In order to steer the traffic through the aforementioned service chain, the switch s1 inserts in every packet destined to H2 an NSH having an SPI=100 and initializing the SI=2. It is then acting as a CL.

The different elements of the SFC architecture are interconnected by pre-configured tunnels, whose logic is similar to the one that we have seen in our lab experiences.

In particular, the switches s2 and s4 are transparent to the SFC overlay, thus they forward the traffic only looking at the tunnel header.

Finally, the traffic from H2 to H1 is simply forwarded according to the IPv4 data plane.