# Software-defined Named Data Networking

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## Motivation

1. Background

Software-defined networking (SDN) is a computer networking approach where network control is decoupled from forwarding and is directly programmable. SDN and NDN can help each other in various ways. SDNs can benefit from the power of caching from NDNs. NDNs, on the other hand, greatly benefit if it can be adopted with little effort by already existing SDNs. The greater management control and monitoring over the network can also simplify the NDN management. SDN could efficiently distribute content in partially upgraded networks, removing the necessity to upgrade the full network and thus easing the deployment and transition phase.

P4 is a programming language designed to allow programming of packet forwarding planes. The P4 OpenFlow agent allows the SDN controller to configure P4 switches through the OpenFlow protocol. Therefore, P4 framework allows the hardware/software devices to parse NDN names with variable length, and the SDN controller could manage the NDN capable switches.

B. Scenario

In this project, we plan to use/re-implement the NDN-P4 switch (basic NDN packet parser, and then deploy the SDN controller to manage the NDN-P4 switches. Specifically, when two NDN applications are communicate using NDN primitives (Interest and Data exchange), the SDN controller would install forwarding rules reactively.

## Contribution to NDN

This project is to provide the common SD-NDN platform for researchers. Since some hardware has been able to support P4, this project can be seen as the first step for the future hardware implementation.

## Tasks

* Clarify the project goal.
* Make plans for implementation. For example, make the jobs of SDN controller and NDN routers clear.
* Implement code.
* Demonstrate the workflow of SD-NDN (installing forwarding rules reactively for communicating peers)

## Required Knowledge for Participants

* Language: C++/Python
* Platforms: P4, SDN, NDN
* Others: ndn-cxx Code Style and Coding Guidelines

## Expected Outcome

Expected outcome is to allow the SDN controller to install forwarding rules reactively when two NDN applications are exchanging packets, successfully forwarding NDN packets to the other end.