# Starting with floodlight,mininet,docker

## SDN

The Internet has led to the creation of a digital society,where everything is connected and is accessible from anywhere.It is both difficult to configure the network the network according to predefined policies,and to reconfigure it to respond to faults,load and changes. Software Defined Networking(SDN) is an emerging paradigm that promises to change this state of affairs,by breaking vertical integration,separating the network’s control logic from underlying routers and switches,promoting centralization of network control,and introducing the ability to program the network.Current networks are also vertically integrated,the control plan(that decides how to handle network traffic) and the data plane(that forwards traffic according to the decisions made by control plane).

SDN firstly,it breaks the vertical integration by separating the network’s control logic(the control plane) from the underlying routers and switches that forward the traffic(data plane).Secondly,with the separation of the control and data planes,network switches become simple forwarding devices and the control logic is implemented in a logically centralized controller(or network operating system)

Simplifying policy enforcement and network (re)configuration and evolution.

The controller exercises direct control over the state in the data-plane elements via this well-defined application programming interface(API).The most notable example of such an API is OpenFlow.An openFlow switch has one or more tables of packet-handling rules(flow table).

Basically,computer network can be divided in three planes of functionality:the data,control and management plane.The manage plane includes the software service,such as SNMP-based tools,used to remotely monitor the configure the control functionality.Network policy is defined in the management plane,the control plane enforces the policy,and the date plane executes it by forwarding data accordingly.

**So,what is SDN?**

Define a SDN with 4 pillars:

1. The control and data planes are decoupled.Control functionality is removed from network devices that will become simple(packet forwarding) elements.
2. Forwarding decisions are flow-based,instead of destination-based.Flow programming enables unprecedented flexibility,limited only to the capabilities of the implemented flow tables.
3. Control logic is moved on an external entity,the so-called SDN controller or Networking Operating System(NOS).
4. The network is programmable through software applications running on the top of the NOS that interacts with the underlying data plane device.This is the fundamental characteristic of SDN,considered as its main value proposition.

**The advantages of SDN:**

1. it is simpler and less error-prone to modify network policies through high level language.
2. second,a control program can automatically react to spurious changes of network state and thus maintain the high-level policies intact.
3. Centralization of the control logic in a controller with the global knowledge of the network state simplifies the development of more sophisticated networking functions,services and application.

**Terminology**

* **Forwarding Devices(FD)**

**Hardware or software-based data plane devices that perform a set of elementary operations.**

* **Data Plane(DP)**

**Forwarding devices are interconnected through wireless radio channels or wired cables.**

* **Southbound Interface(SI)**

**The instruction set of the forward-devices is defined by the southbound API,and also defines**

**the communication protocol between forwarding devices and control plane element.**

* **Control plane**

**The control plane elements through well-defined SI.The contrrol plane can be seen as the**

**“network brain”.**

* **Northbound interface(NI)**

**The network operating system can offer an API to application developers.This API represents**

**a northbound interface.**

* **Management plane(MP)**

**The management plane is the set of applications that leverage the functions offered by the NI**

**to implement network control and operation.**

## SDN DATA PLANE AND OPENFLOW

## OpenFlow is both a specification of the logical structure of data plan functionality and a protocol between SDN controllers and network devices.

## **OpenFlow channel**:Interface between an Openflow switch and an openFlow controller,used by the controller to manage the switch.

**Flow**:a flow a sequence of packets traversing a network that share a lot of header field values.For    example,a flow could consist of all packets with the same source and destination IP addresses or all packet with the same virtual LAN(VLAN) identifier.