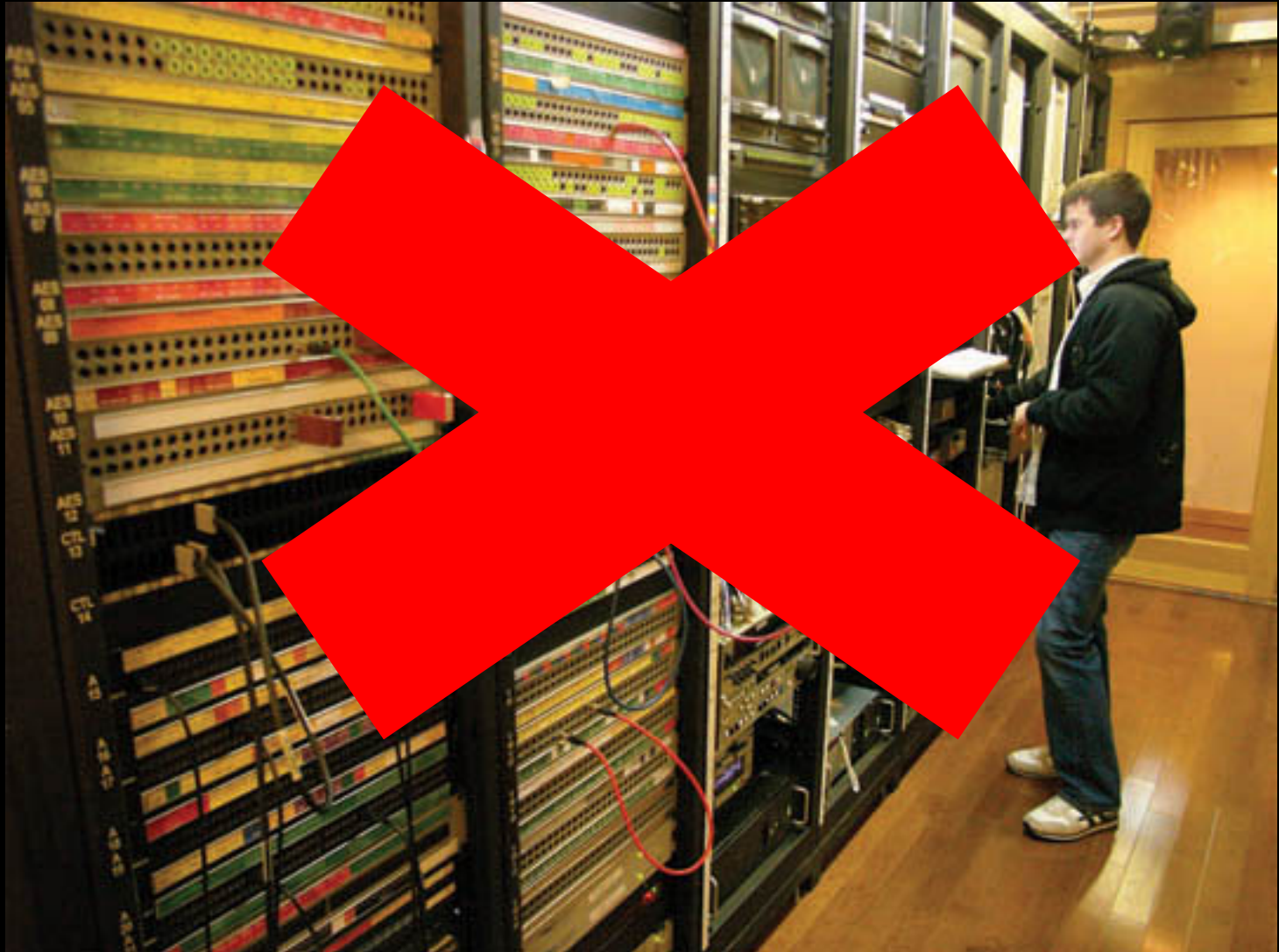


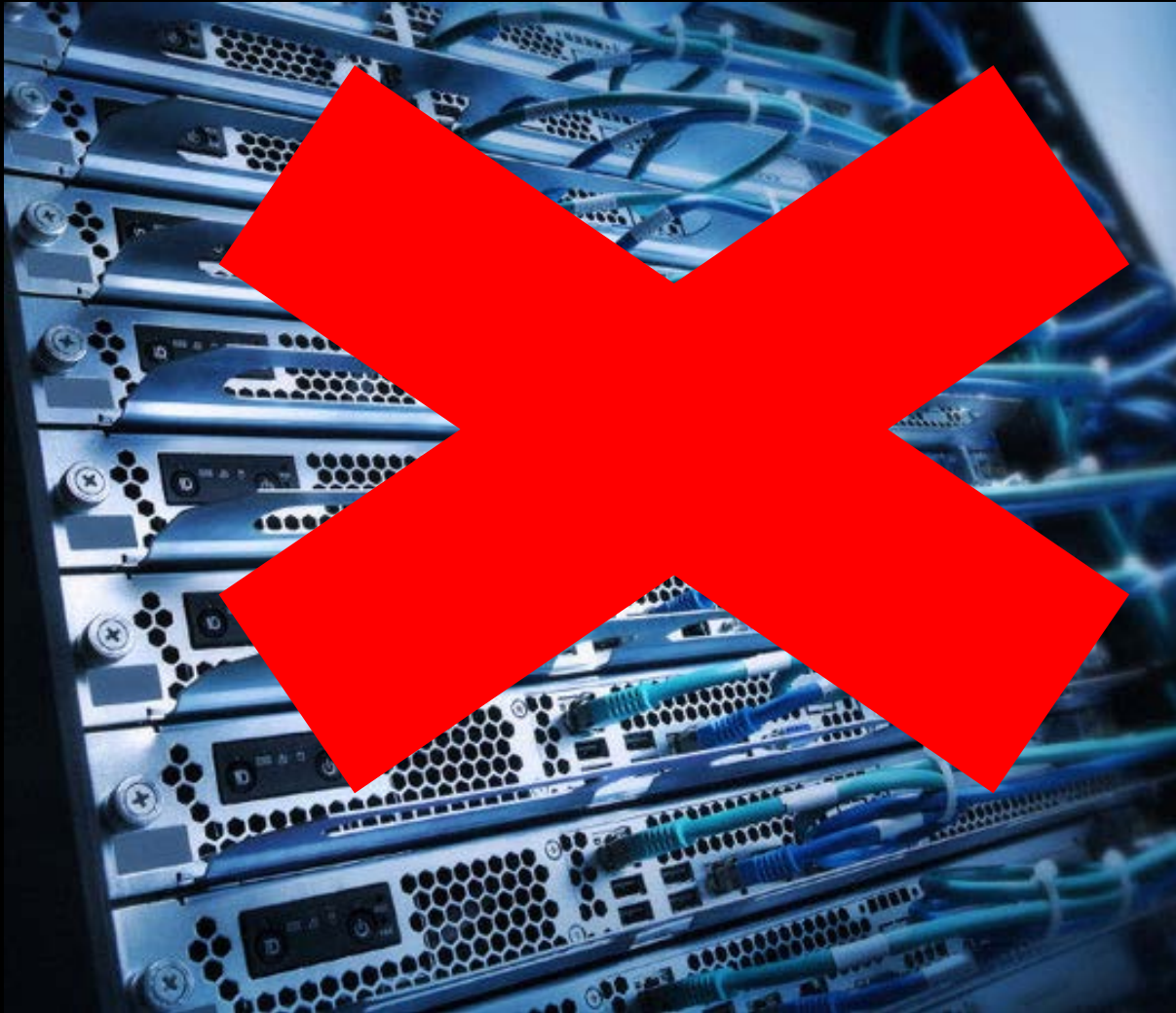
# Cloud Networking

Guy Pujolle

# Network room



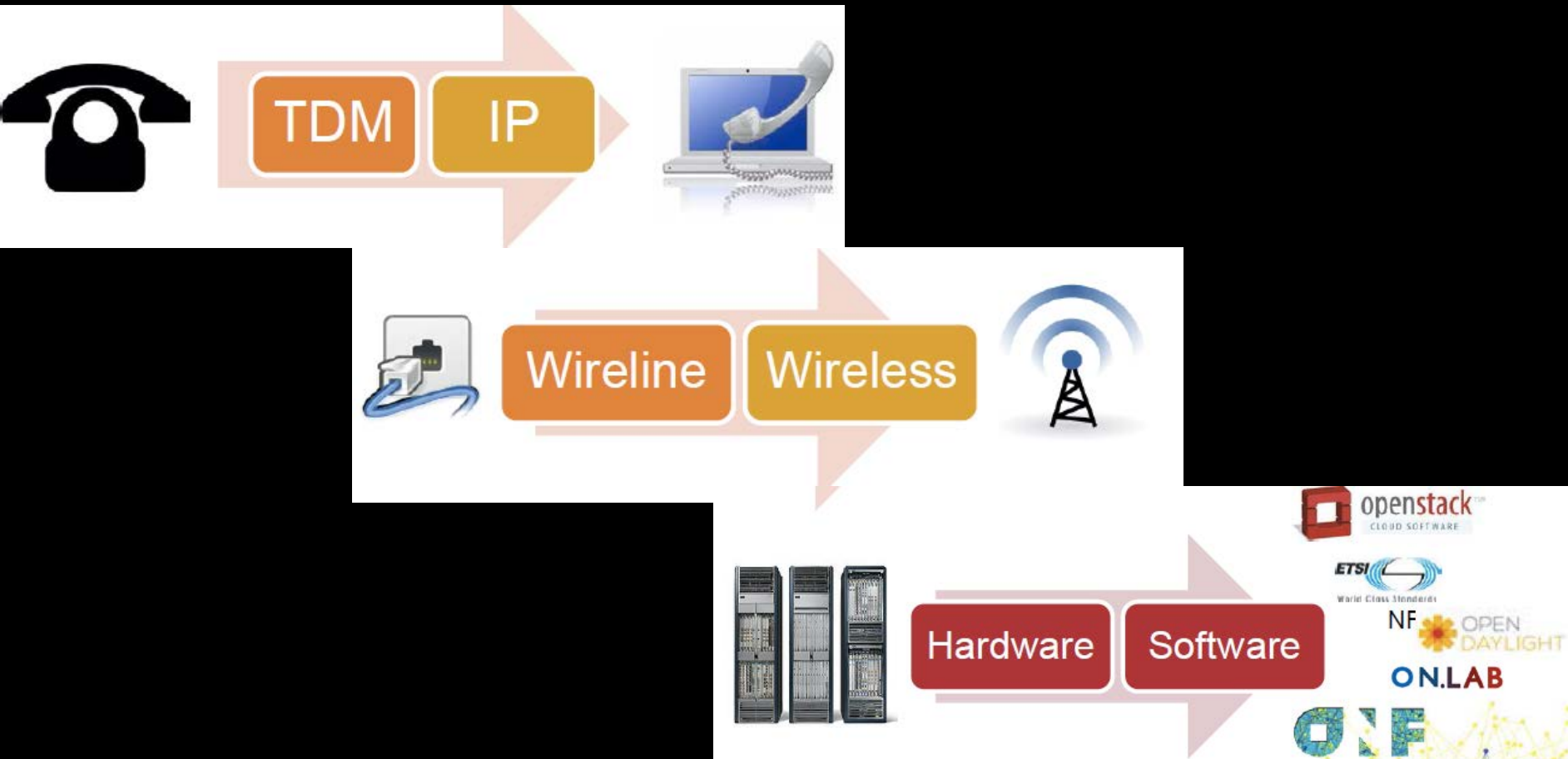
# Hardware network equipment



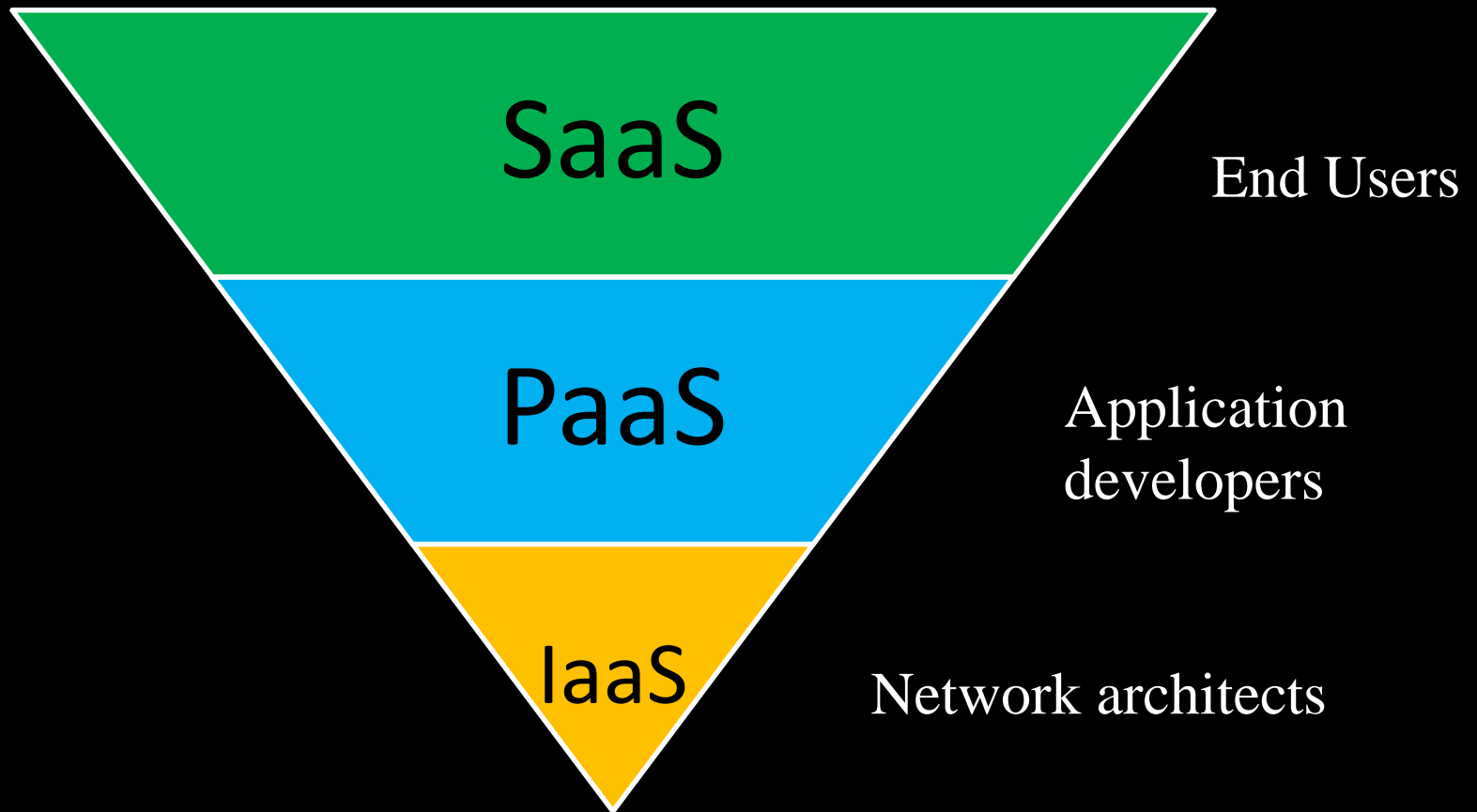
# Smartcard



# The three networking revolutions

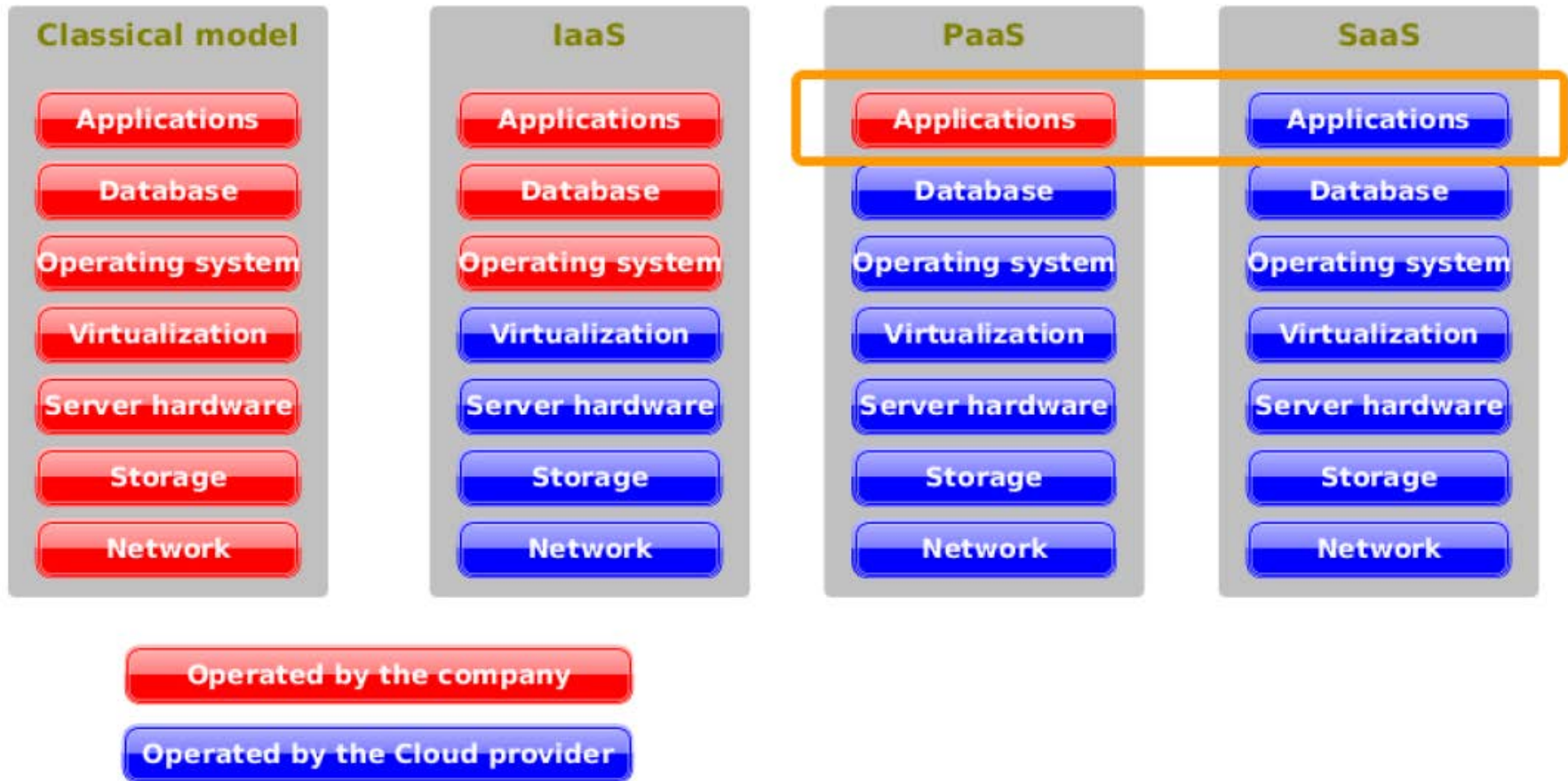


# The different types of Clouds





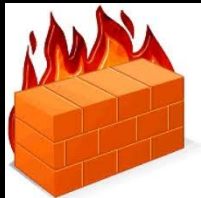
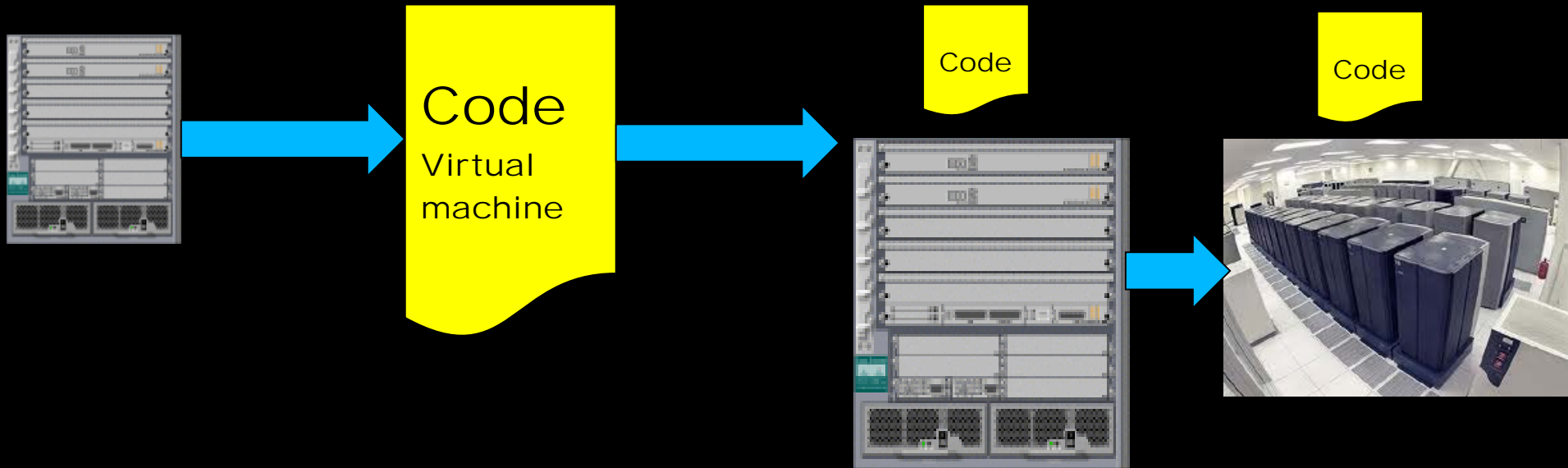
# The different types of Clouds



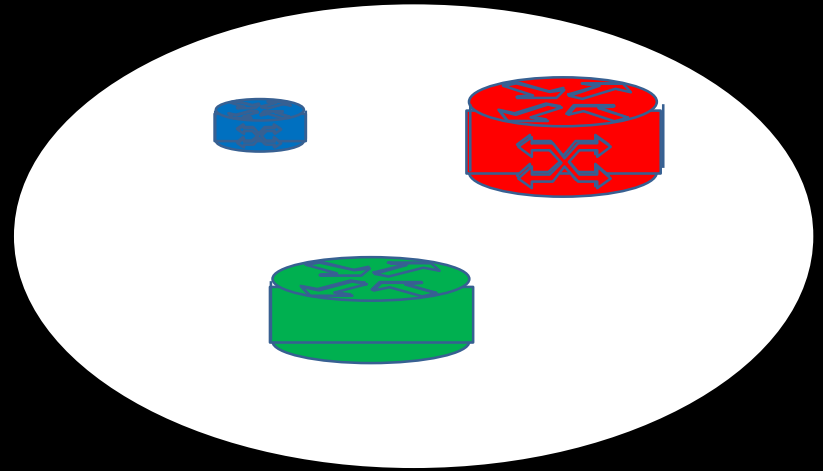
# Network virtualisation



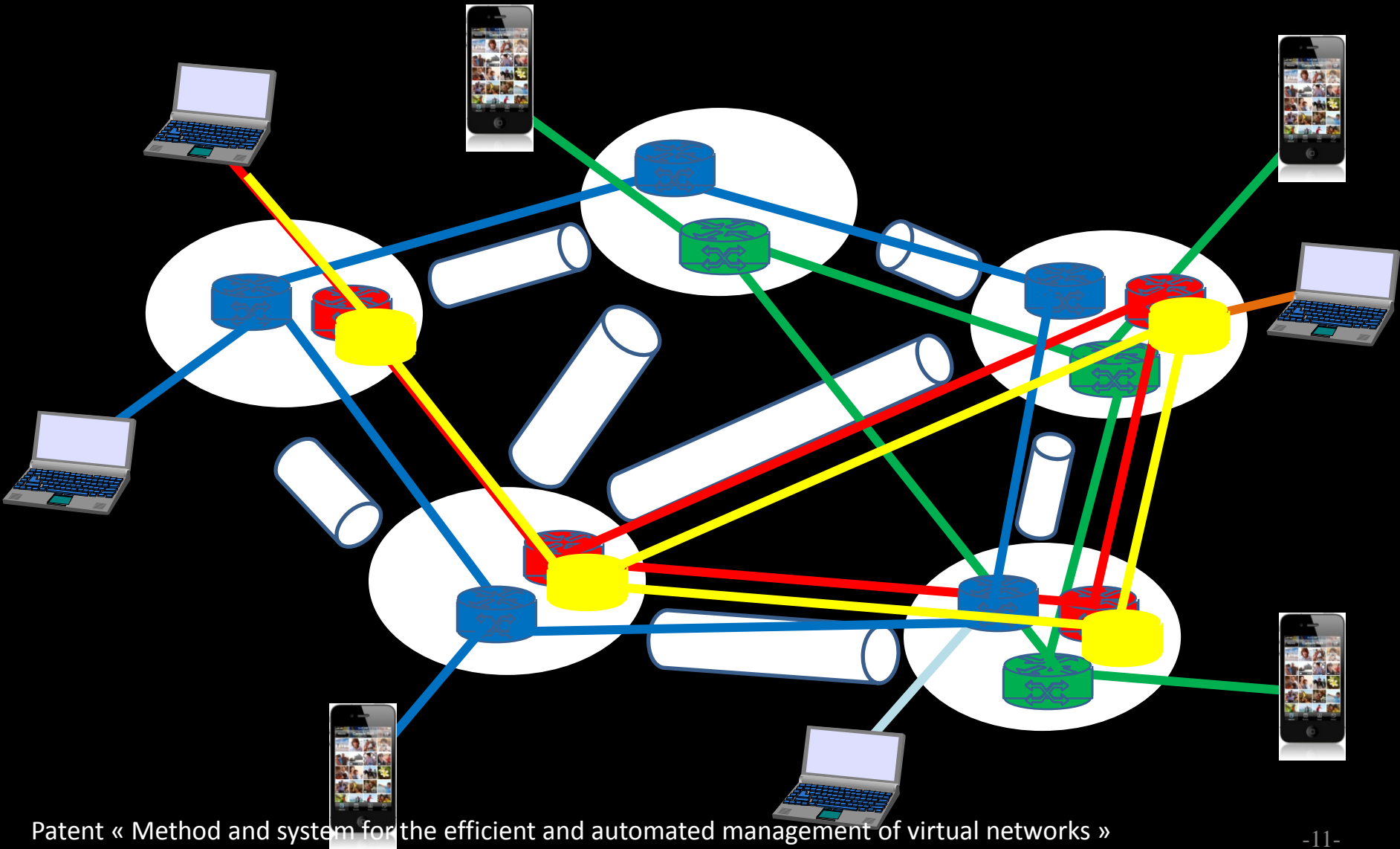
# Virtualization



# Virtual machines

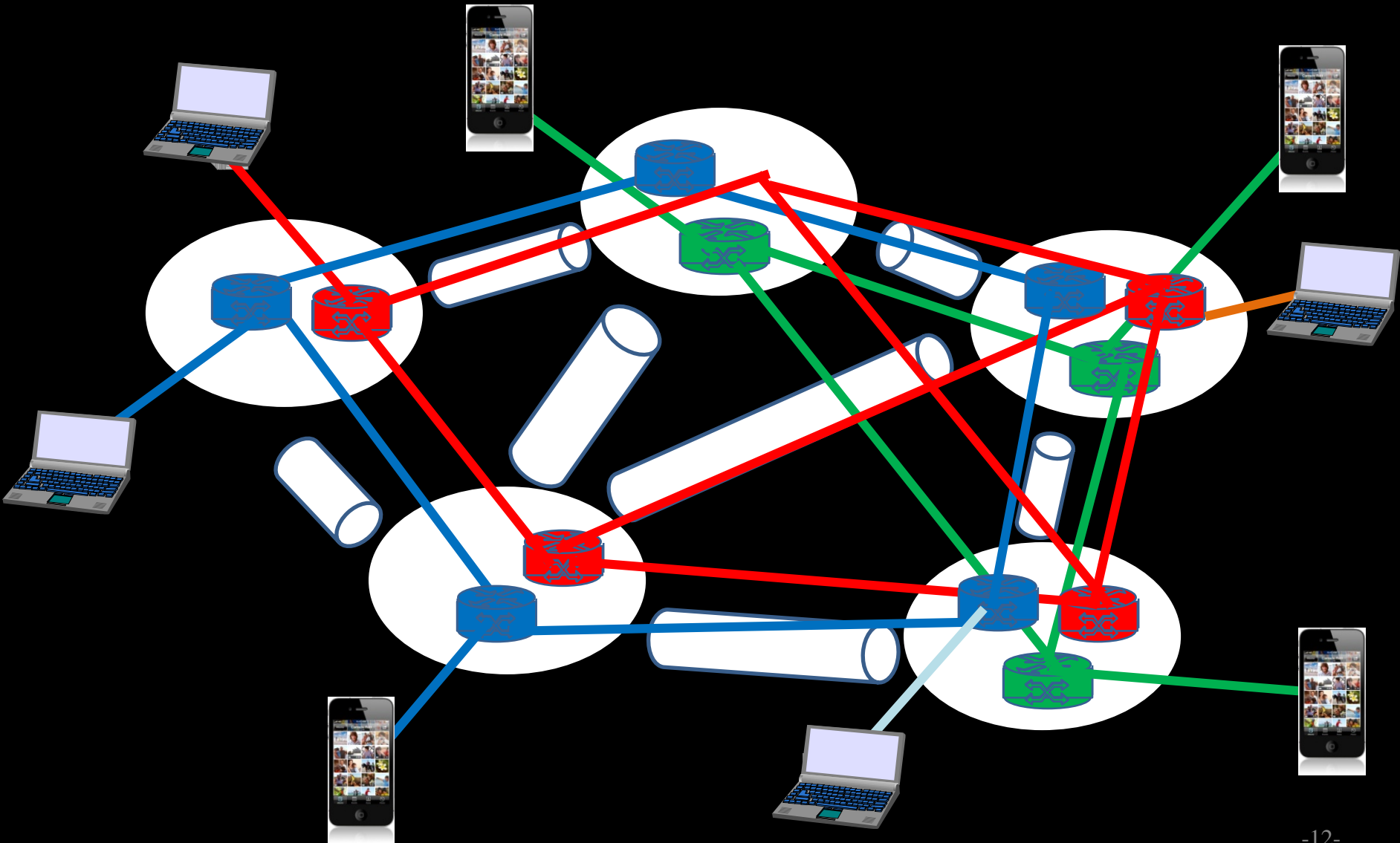


# Virtual networks

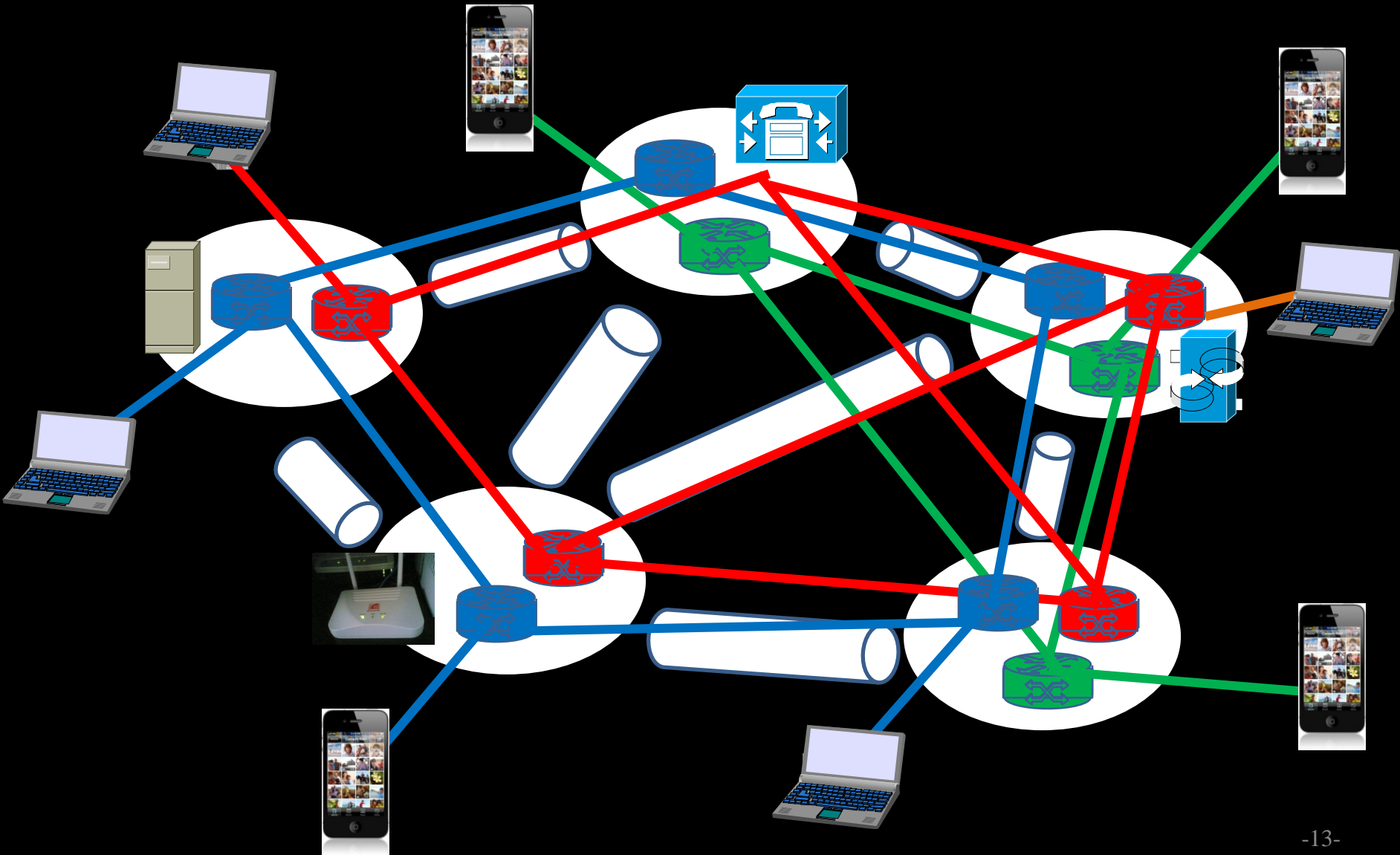


Patent « Method and system for the efficient and automated management of virtual networks »  
Patent « Method and system for deploying at least one virtual network on the fly and on demand »

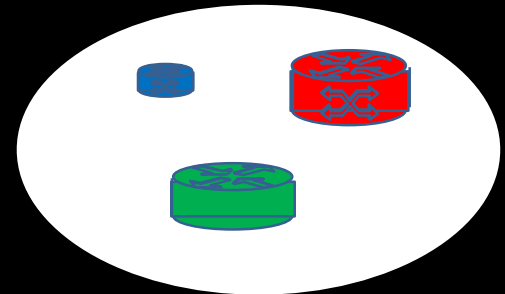
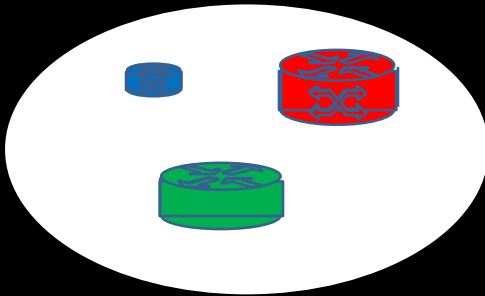
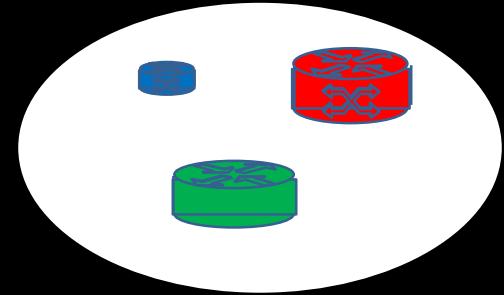
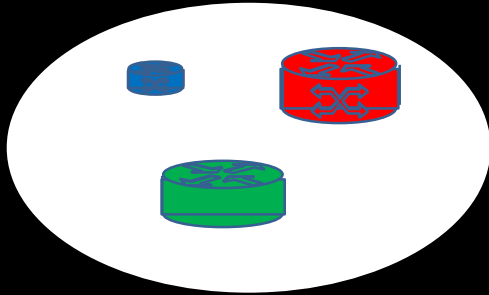
# Migration



# Network urbanization



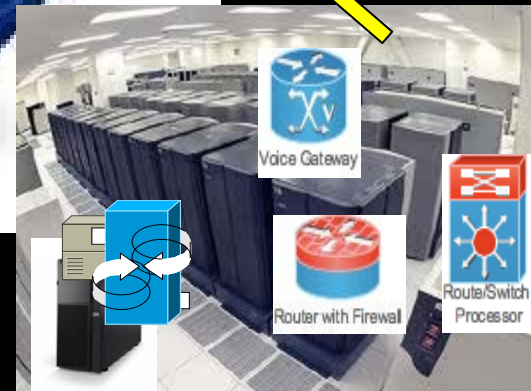
# Energy consumption



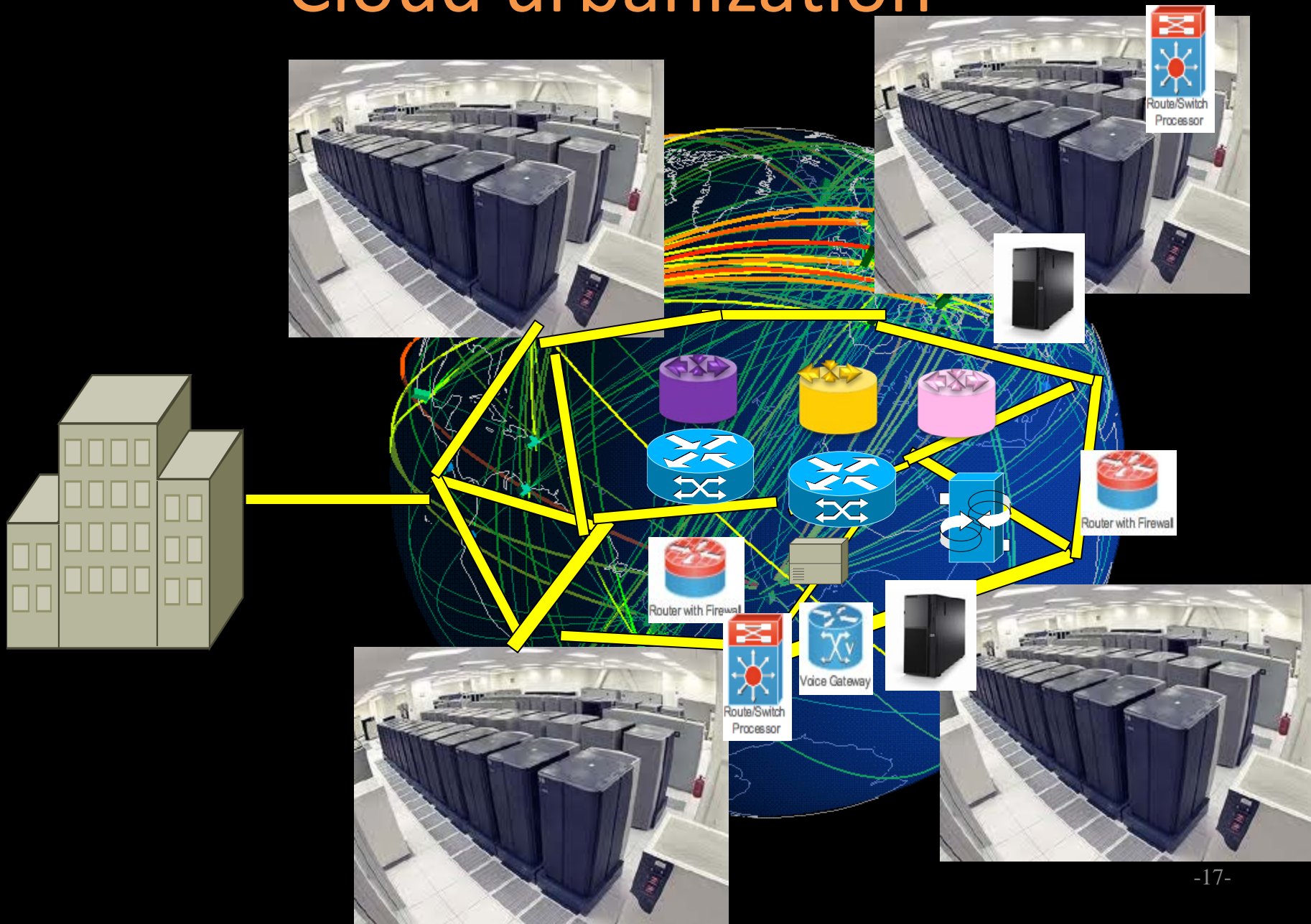
# Cloudifying the network

- New network equipment are inside the Cloud
  - Their size can be changed at will
  - They can migrate
  - They are connected through inter datacentre connections
  - They can be replaced as soon as needed





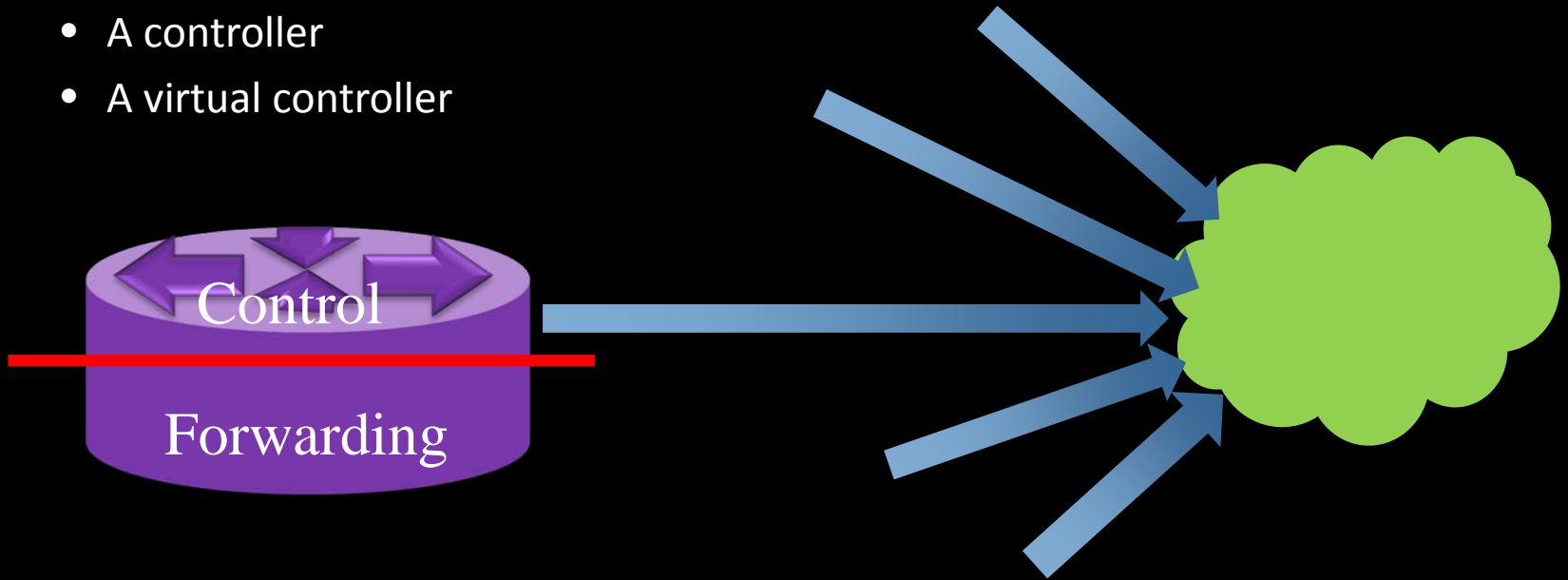
# Cloud urbanization



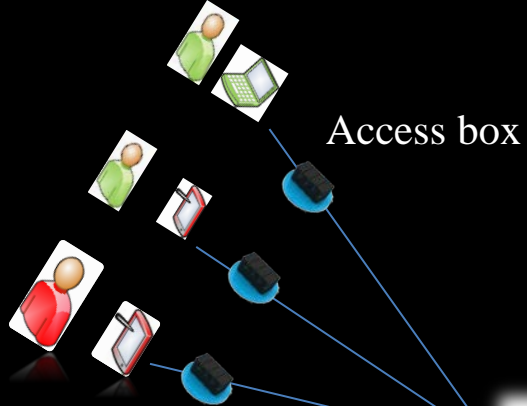
How to control  
How to control

# SDN : Software Defined Networking

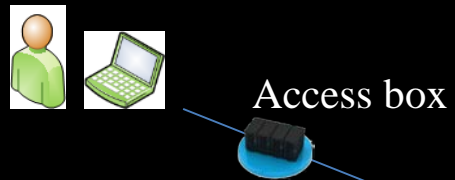
- Decoupling forwarding and control
  - Control is achieved within:
    - A controller
    - A virtual controller



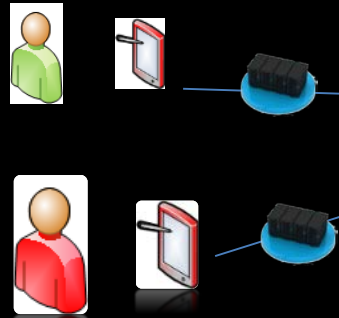




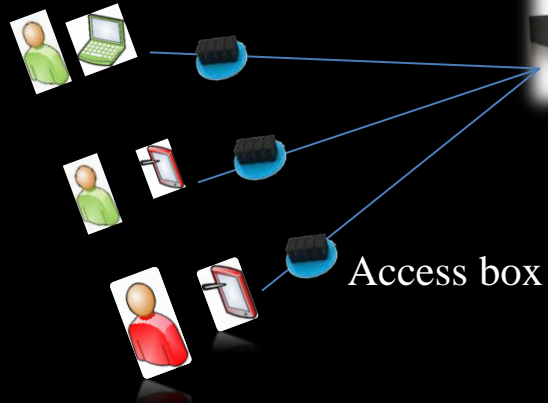
SBC: Session Border Controller



SBC



NAC: Network access controller



SDN controller



# Network architecture



Access

Open Flow Access Point

Virtual WiFi Access Points

Acquisition  
of profiles

Virtual SBC or NAC

Customization

of control schemes

# Virtuor Access Box



100 virtual machines, 8 virtual OpenFlow APs



# Cloudifying the network

# Network architecture

Application  
layer



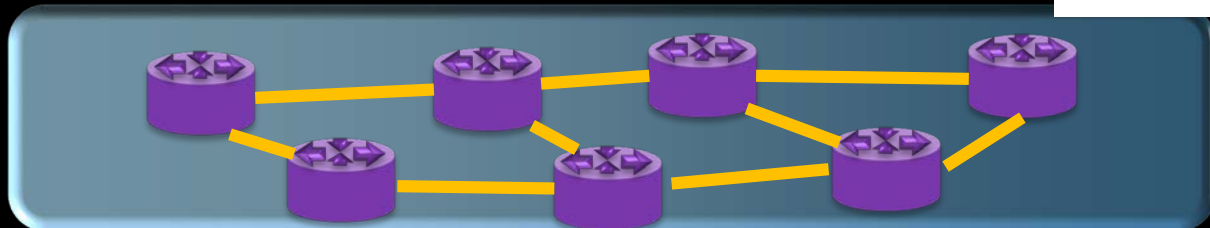
Northbound API

Control  
layer

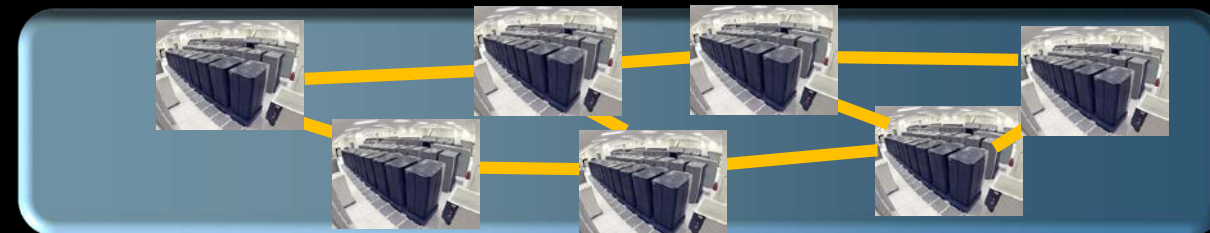


Southbound API

Virtualization  
layer



Infrastructure  
layer



# Network architecture

Business application

Network application



Open stack



Open northbound

Control plane

OpenFlow /SDN



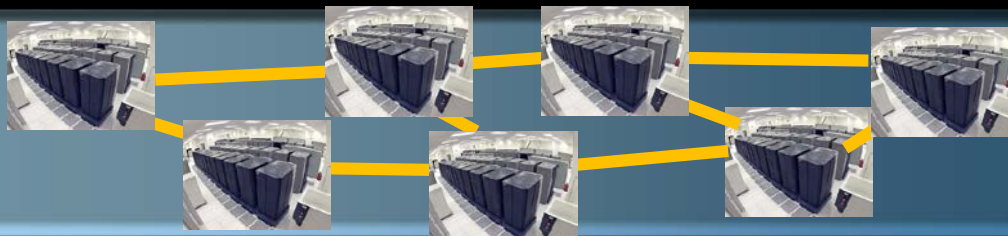
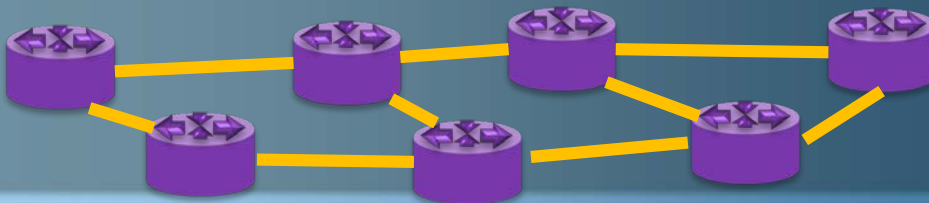
Controller



Open outhband



NFV



# Decoupling network functions

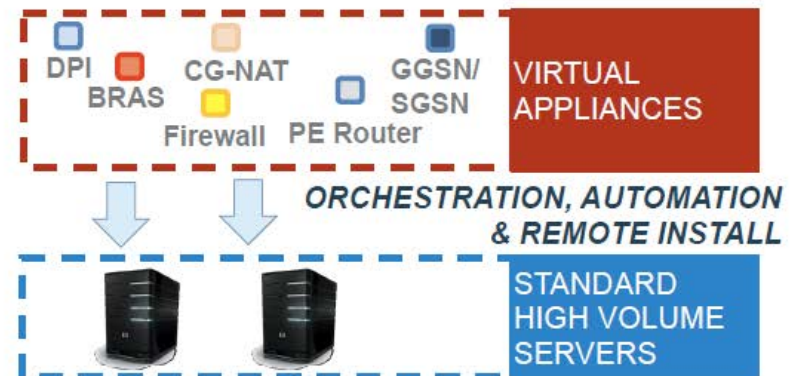
- NVF (Network Functions Virtualization)
  - Objective : decoupling network functions from network equipment

## Traditional Network Model: APPLIANCE APPROACH



- Network Functions are based on specific HW&SW
- One physical node per role

## Virtualised Network Model: VIRTUAL APPLIANCE APPROACH



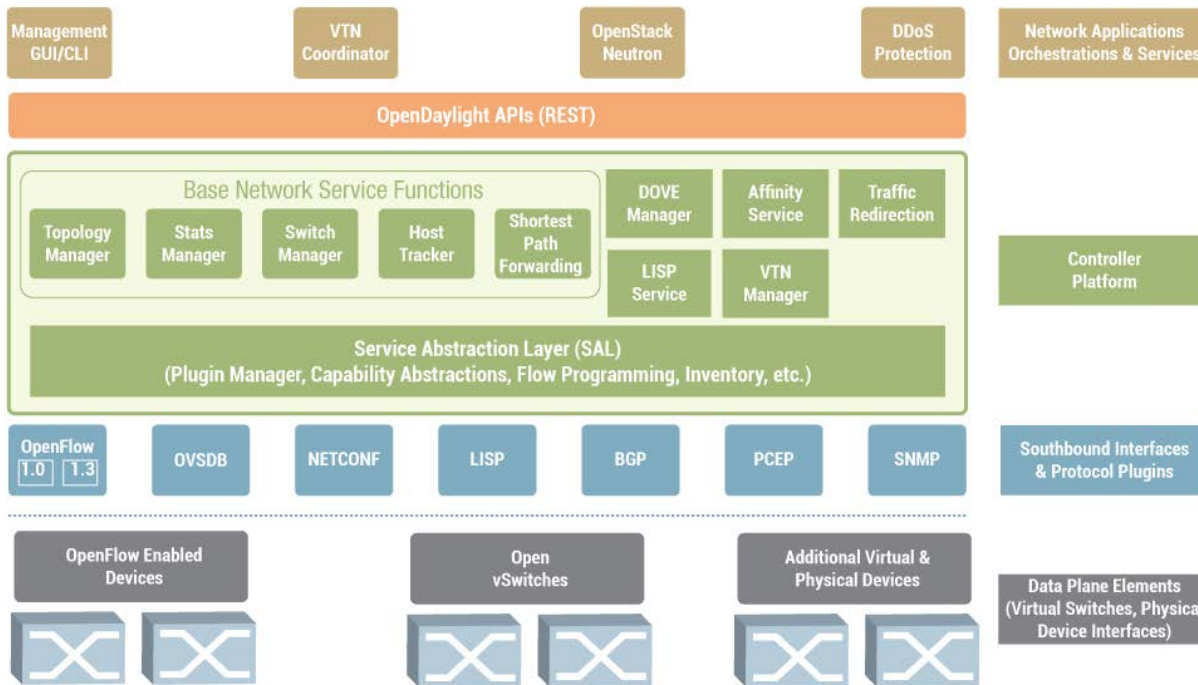
- Network Functions are SW-based over well-known HW
- Multiple roles over same HW

# Open Daylight



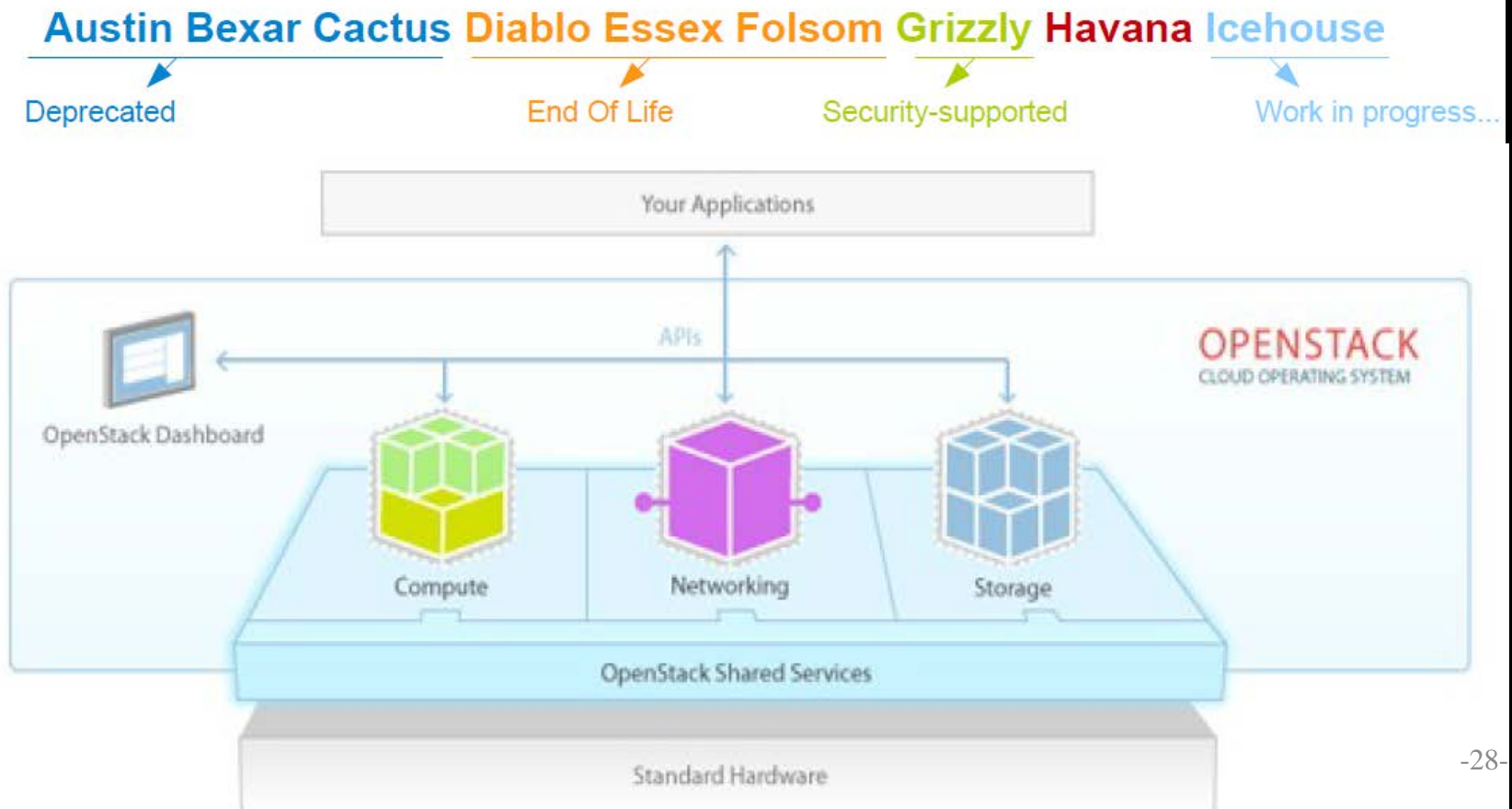
First Code  
Release  
"Hydrogen"

VTN: Virtual Tenant Network  
DOVE: Distributed Overlay Virtual Ethernet  
DDoS: Distributed Denial Of Service  
LISP: Locator/Identifier Separation Protocol  
OVSD: Open vSwitch DataBase protocol  
BGP: Border Gateway Protocol  
PCEP: Path Computation Element Communication Protocol  
SNMP: Simple Network Management Protocol

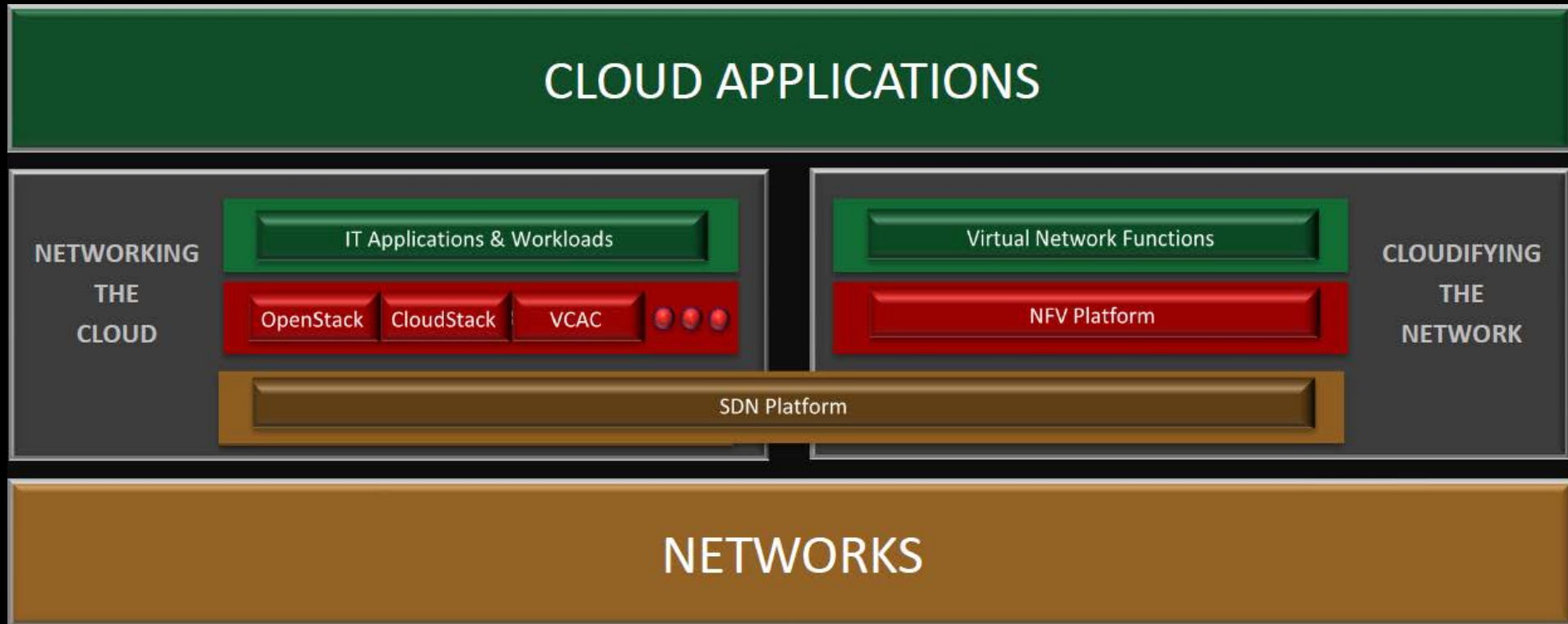


# OpenStack

- Cloud management system that controls large pools of compute, storage, and networking resources throughout a datacenter
- 8 release in 3 years (April 2011 to Nov 2013) - Icehouse will be the 9th



# Summary of Cloud networking





# Questions

