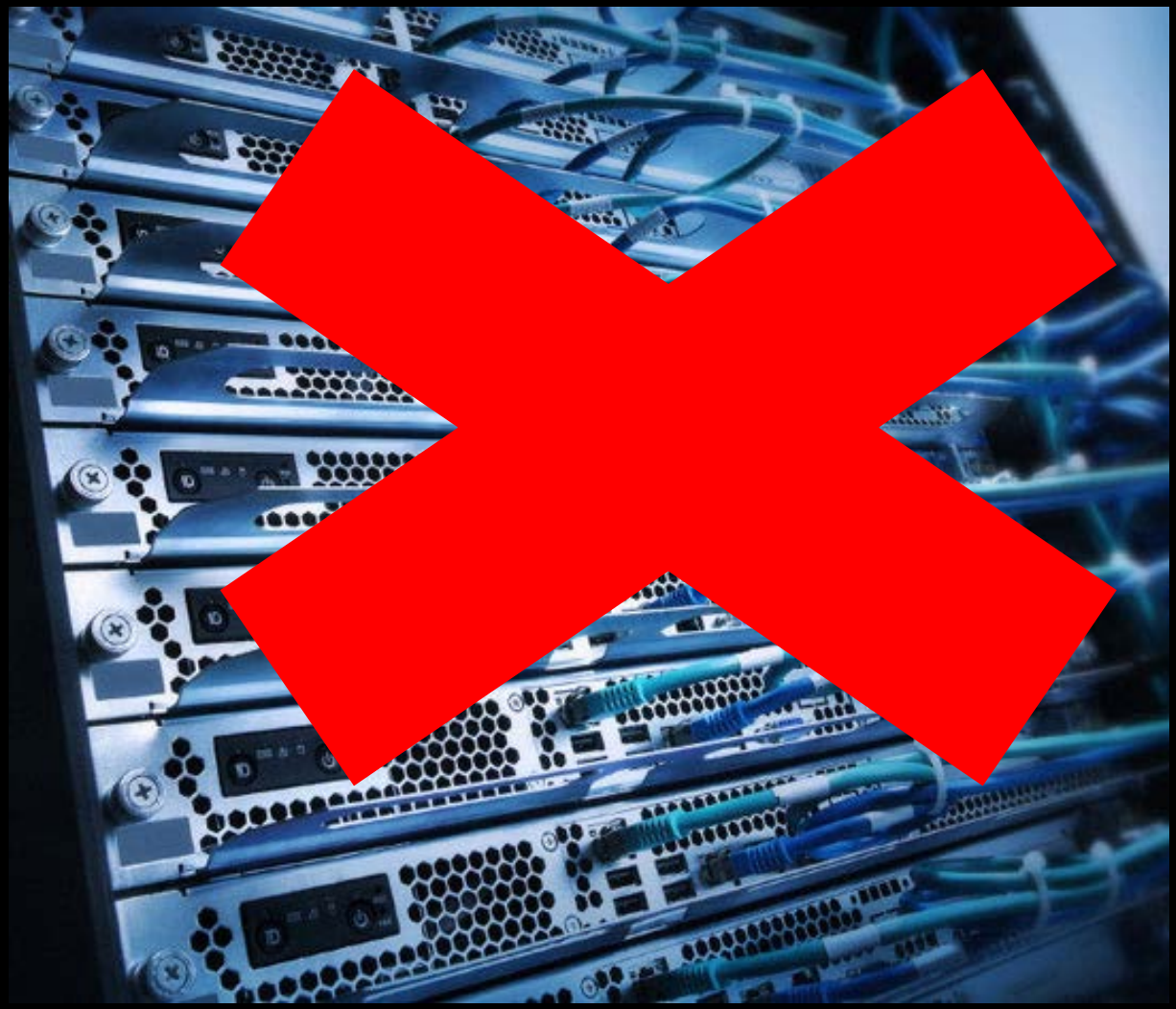
# Cloud Networking

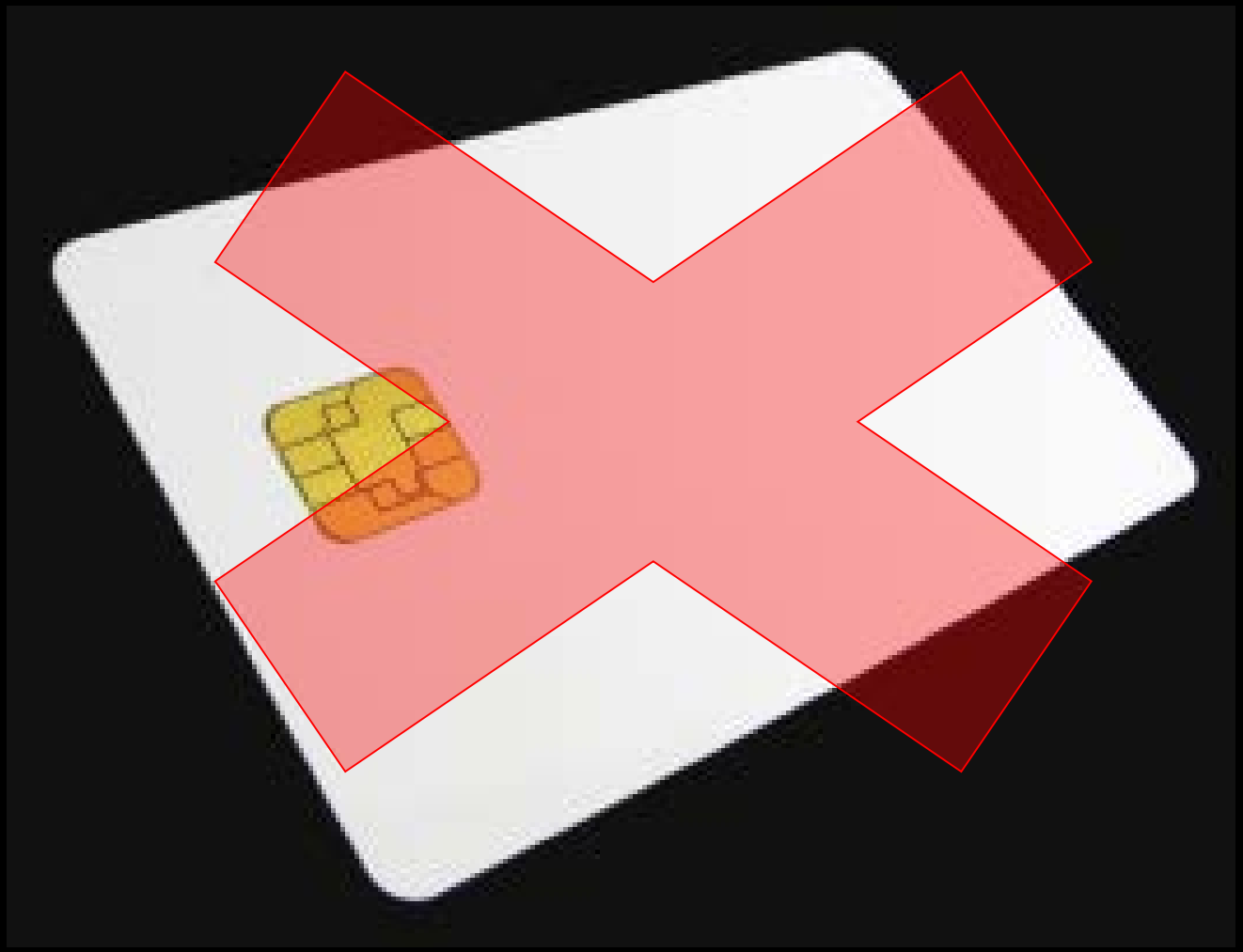
Guy Pujolle

# Network room

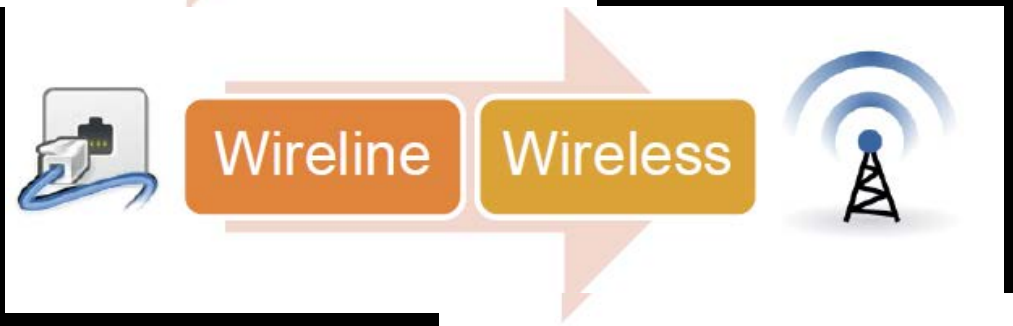
# Hardware network equipment

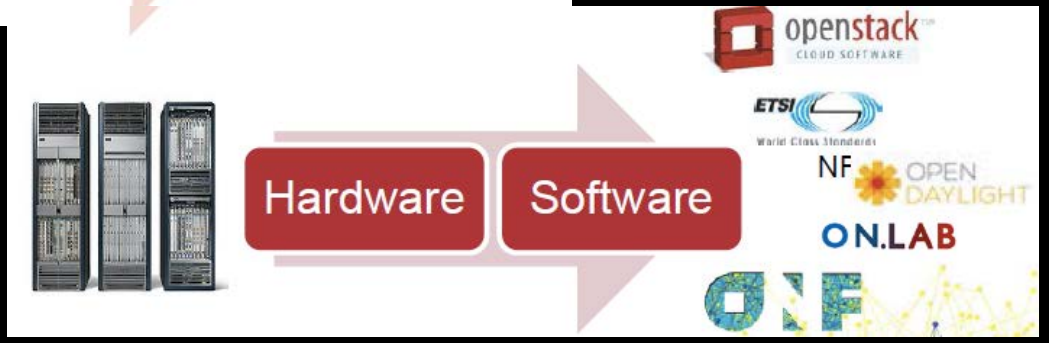


# Smartcard

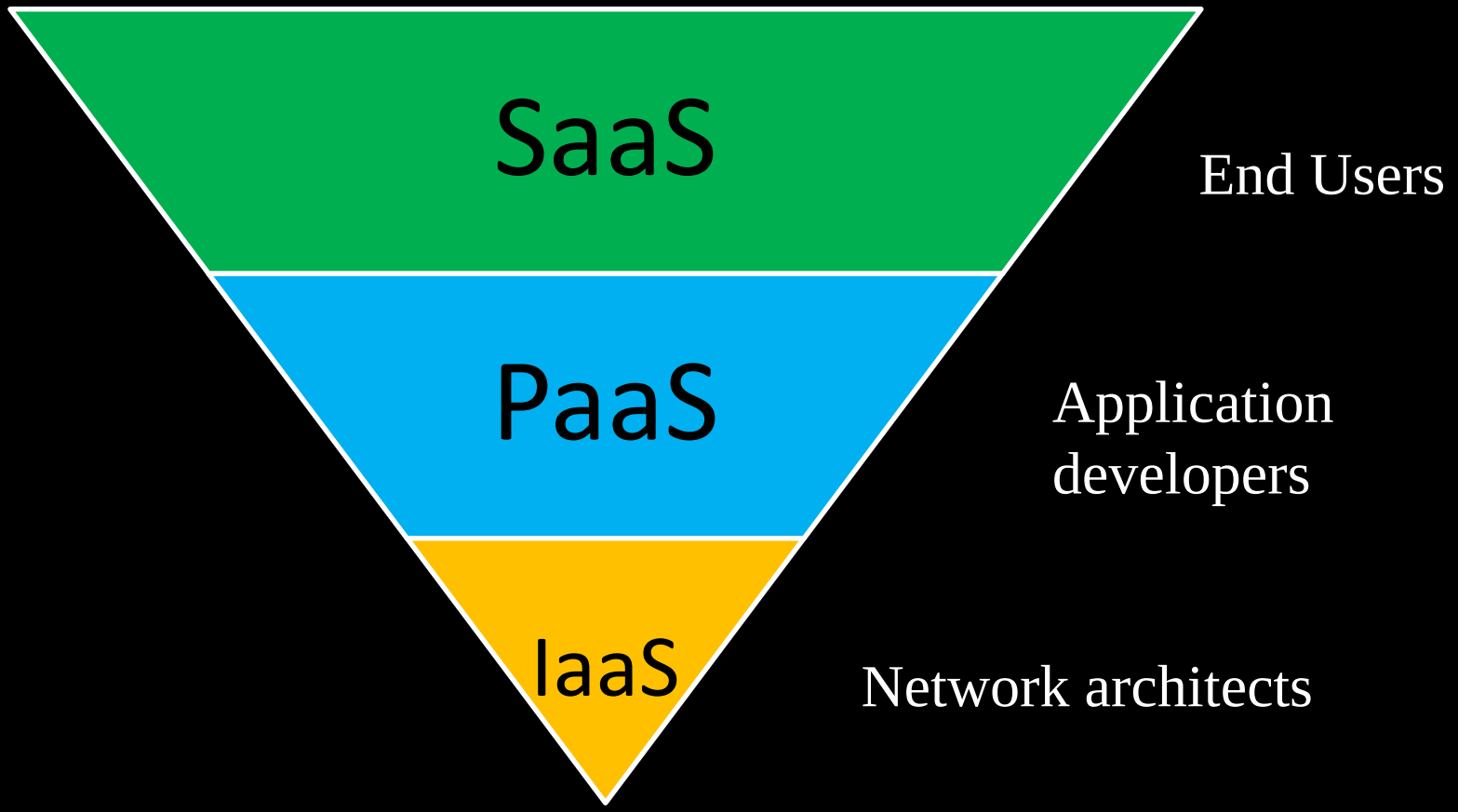


# The three networking revolutions

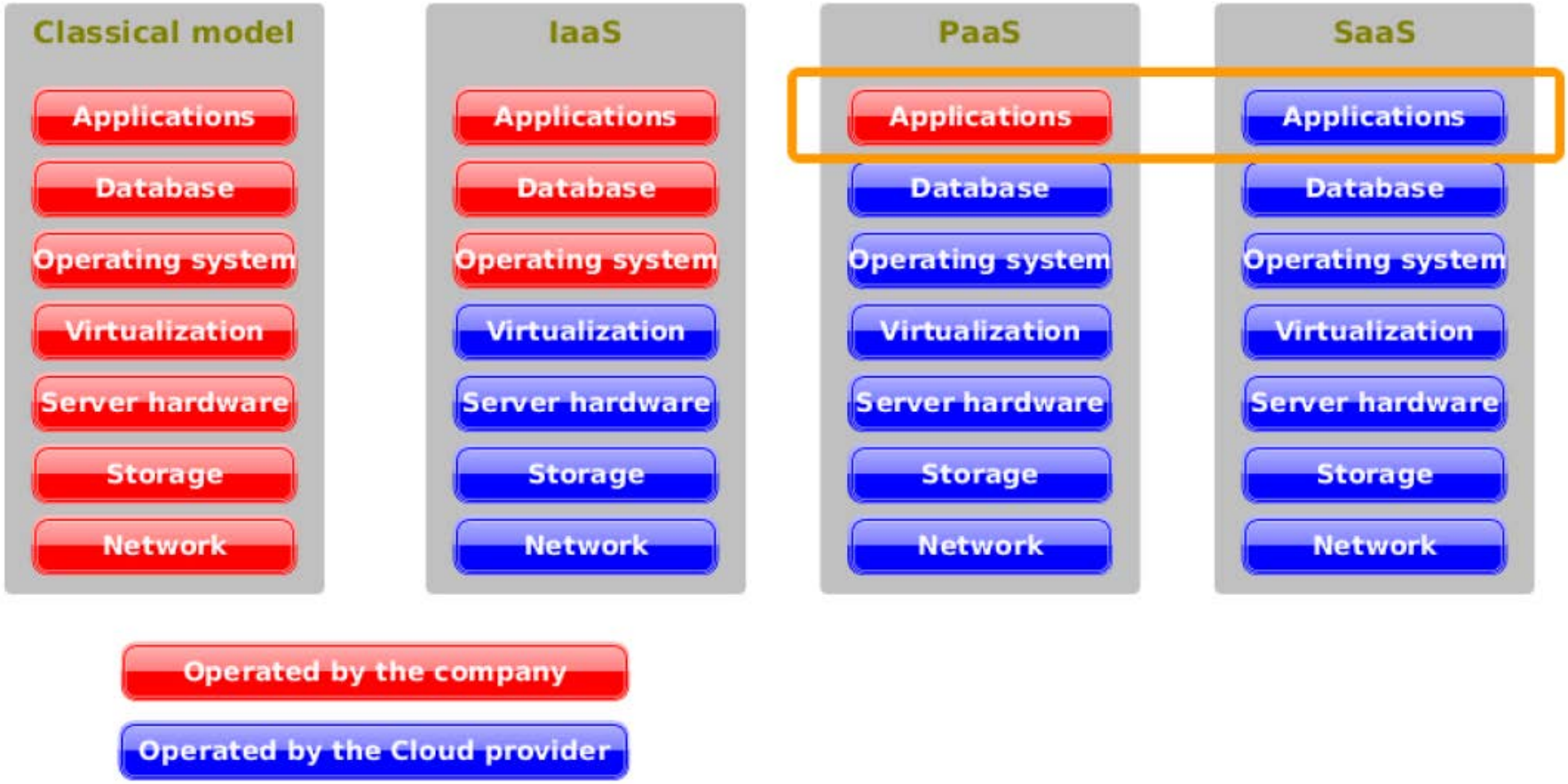



# The different types of Clouds

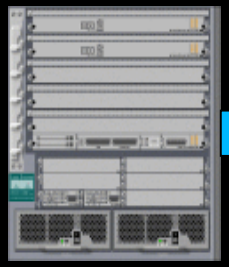


# The different types of Clouds



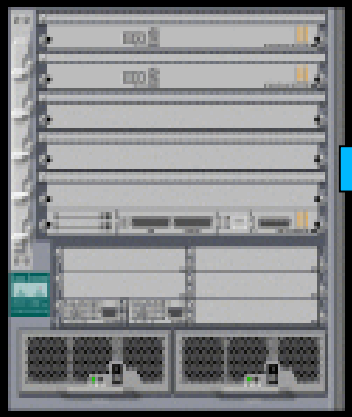
# Network virtualisation

# Virtualization

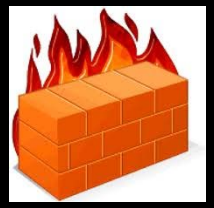


Code
Virtual
machine

Code

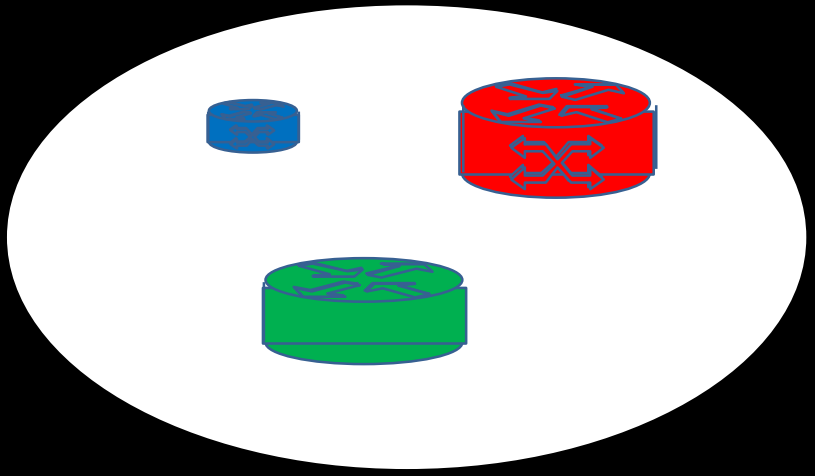


Code

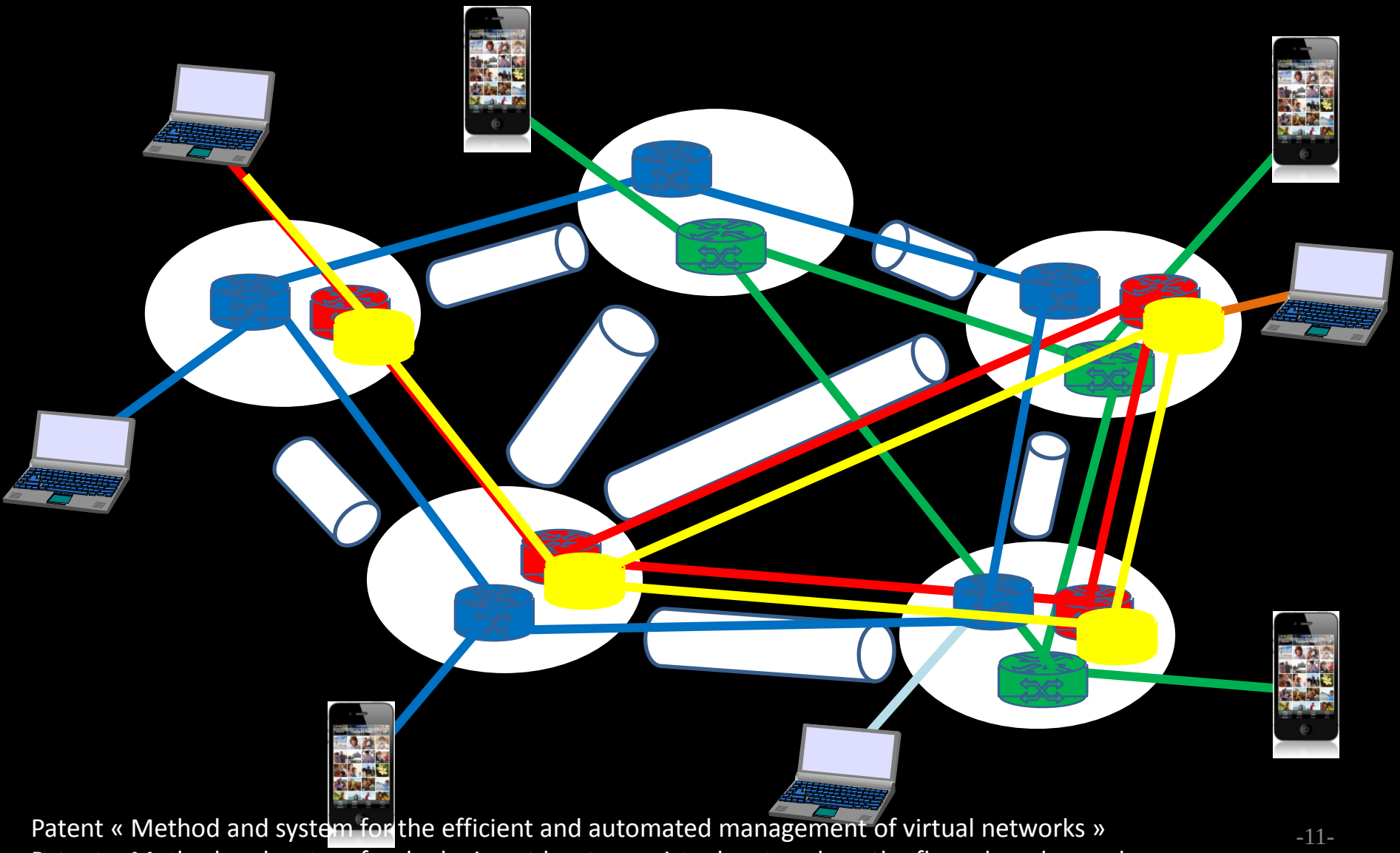





# Virtual machines

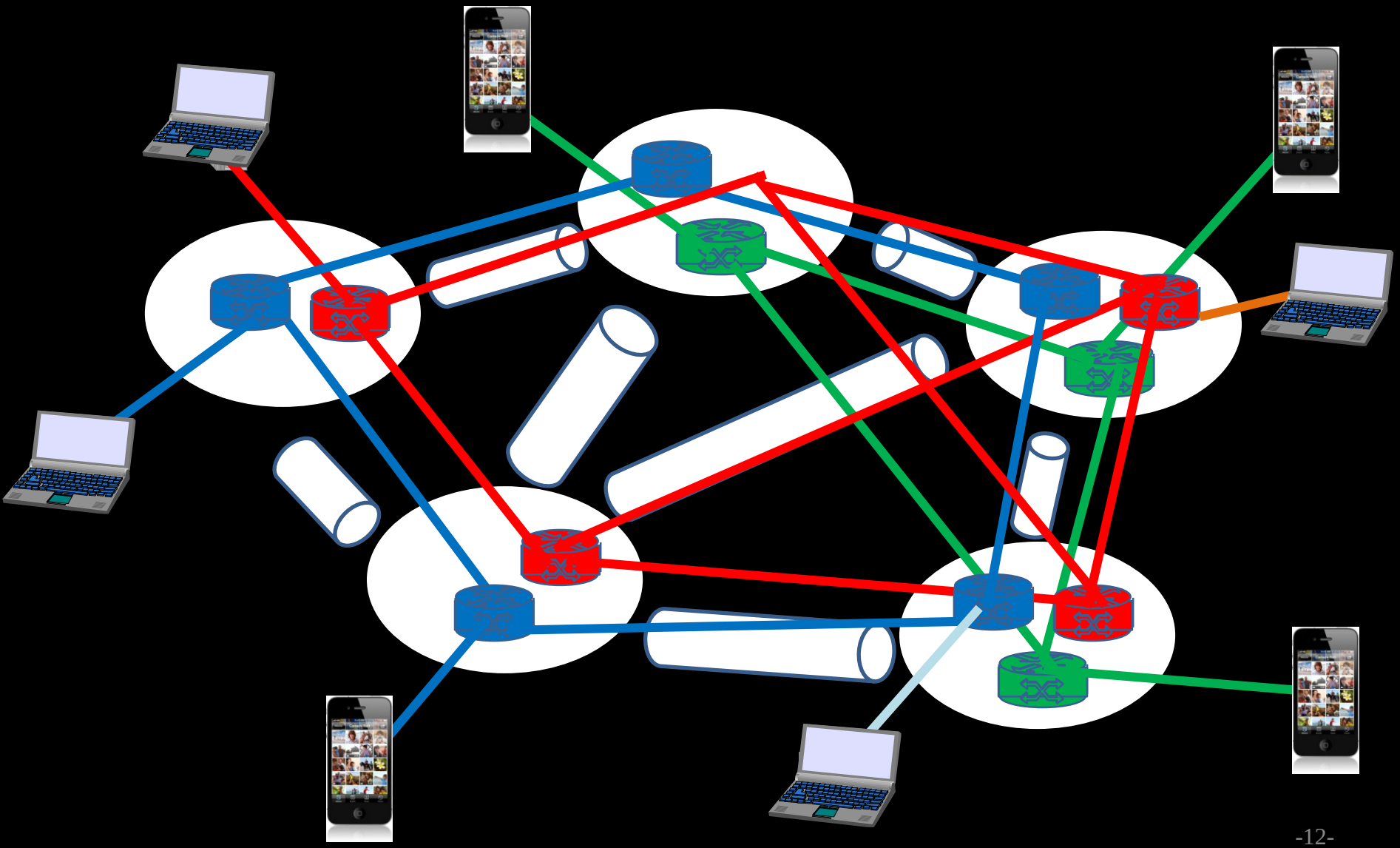


# Virtual networks

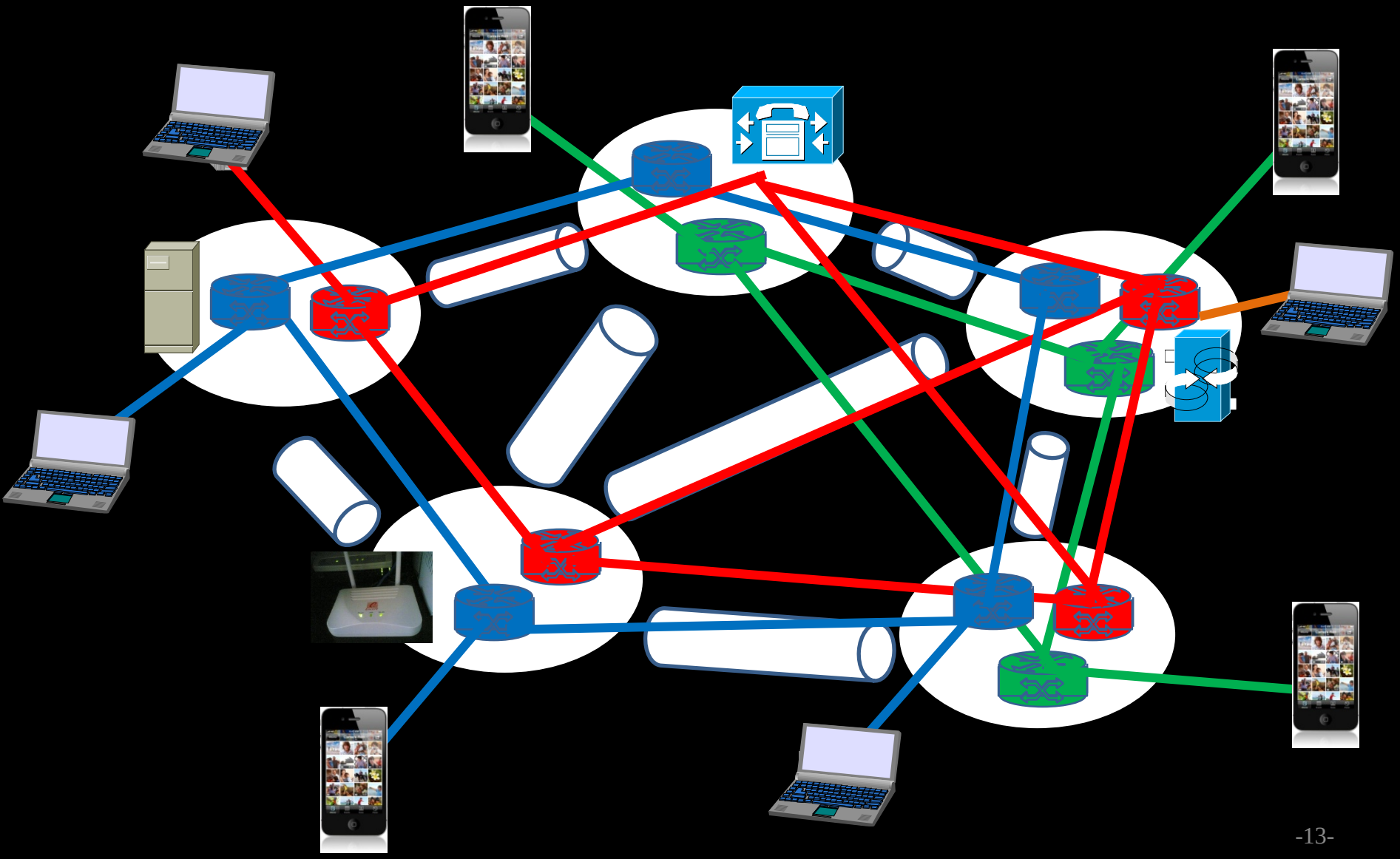


Patent « Method and system for the efficient and automated management of virtual networks »
Patent « Method and system for deploying at least one virtual network on the fly and on demand »

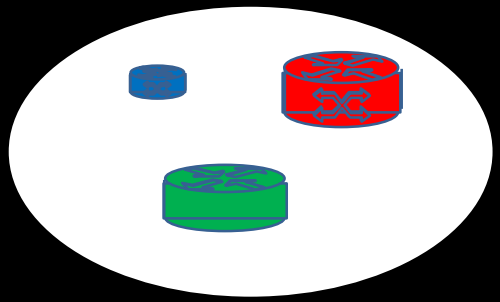
# Migration

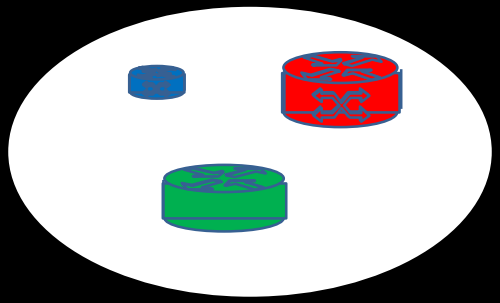


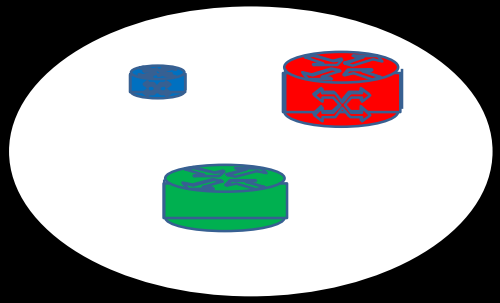
# Network urbanization

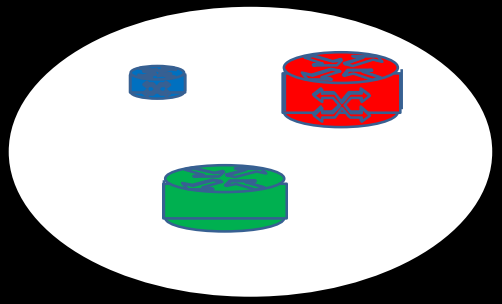


# Energy consumption







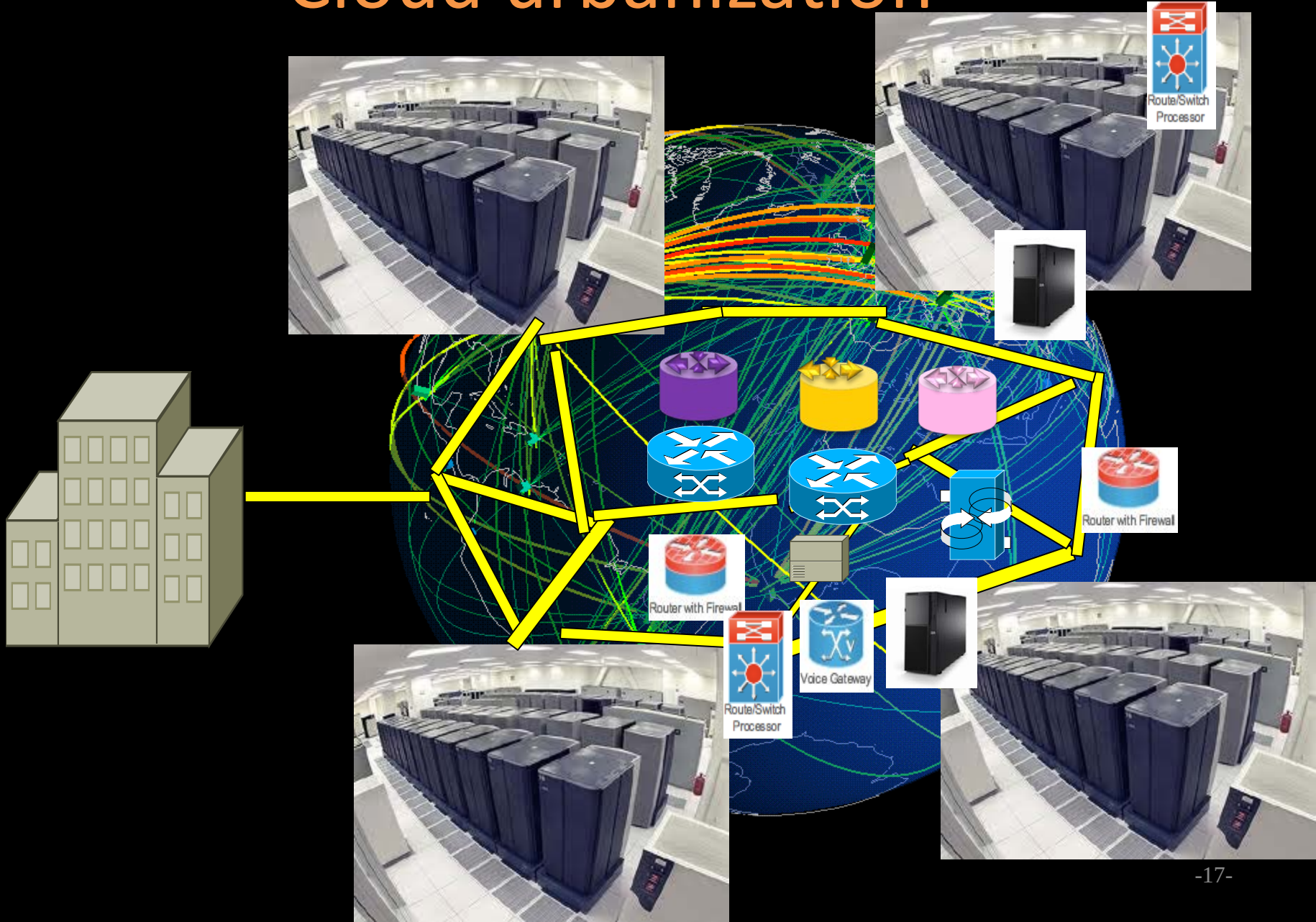


# Cloudifying the network

- 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


Router with Firewall
Voice Gateway
Router with Firewall
Route/Switch Processor

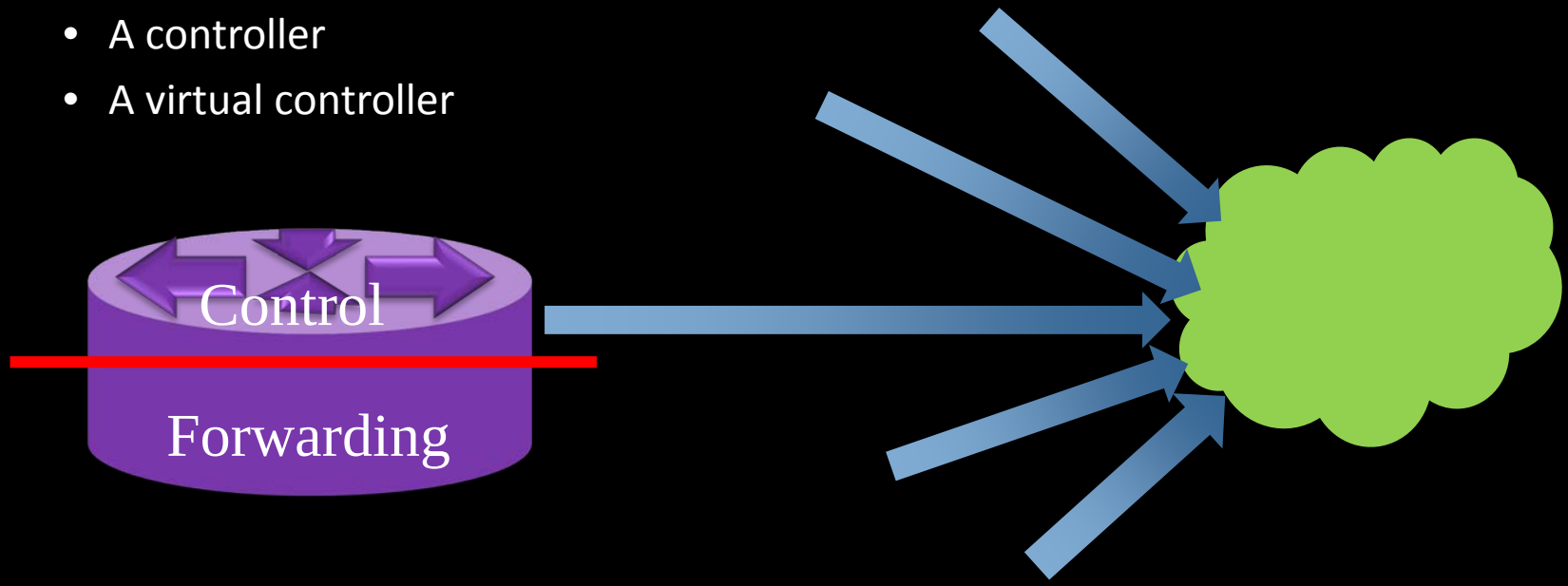
# Cloud urbanization

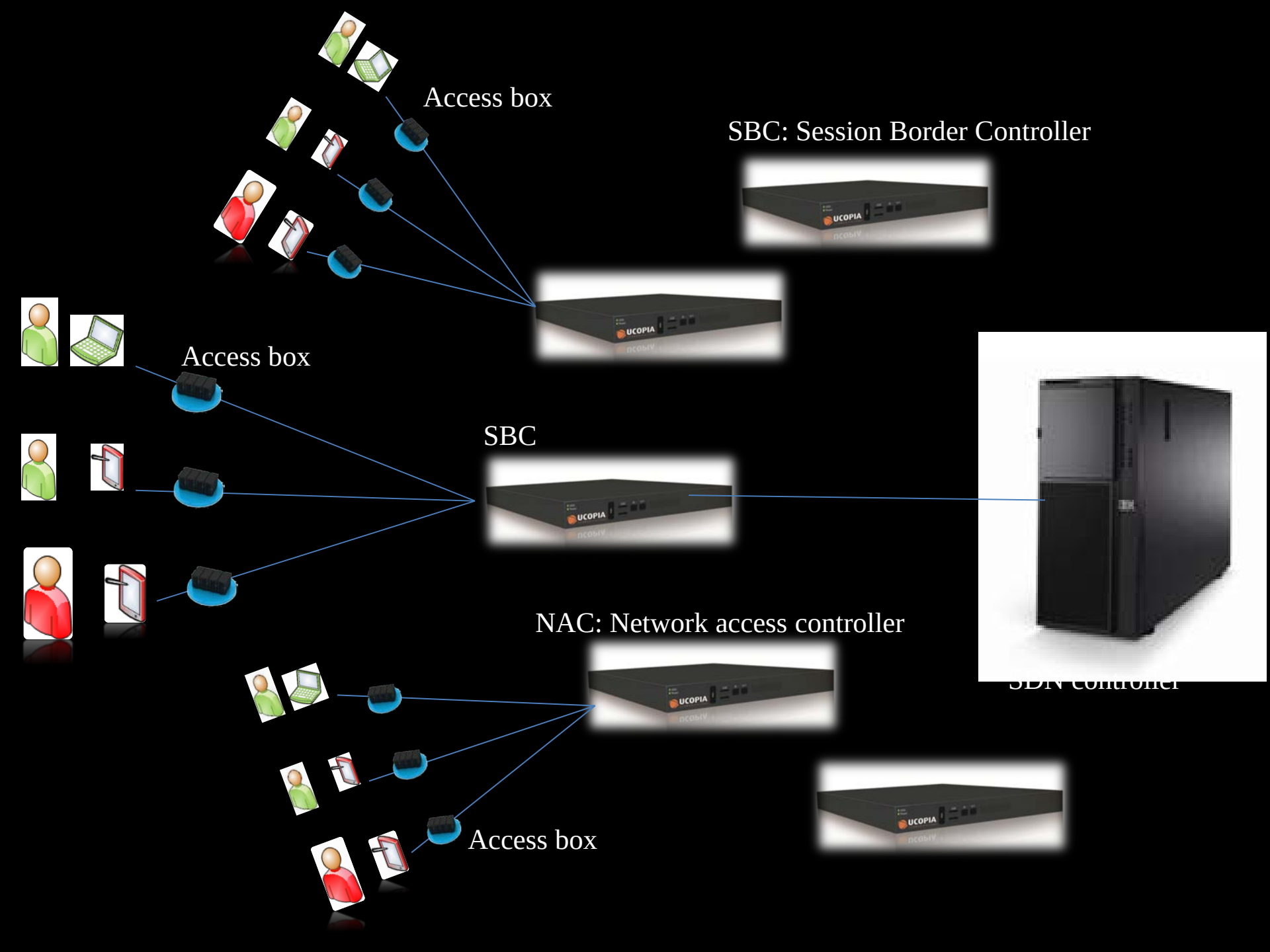


# How to control

# SDN : Software Defined Networking

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




Access box
SBC: Session Border Controller
Access box
SBC
NAC: Network access controller
Access box

# Network architecture


NanoCloud
5G small cell

Access
Open Flow Access Point
Virtual WiFi Access Points

Acquisition
of profiles
Virtual SBC or NAC

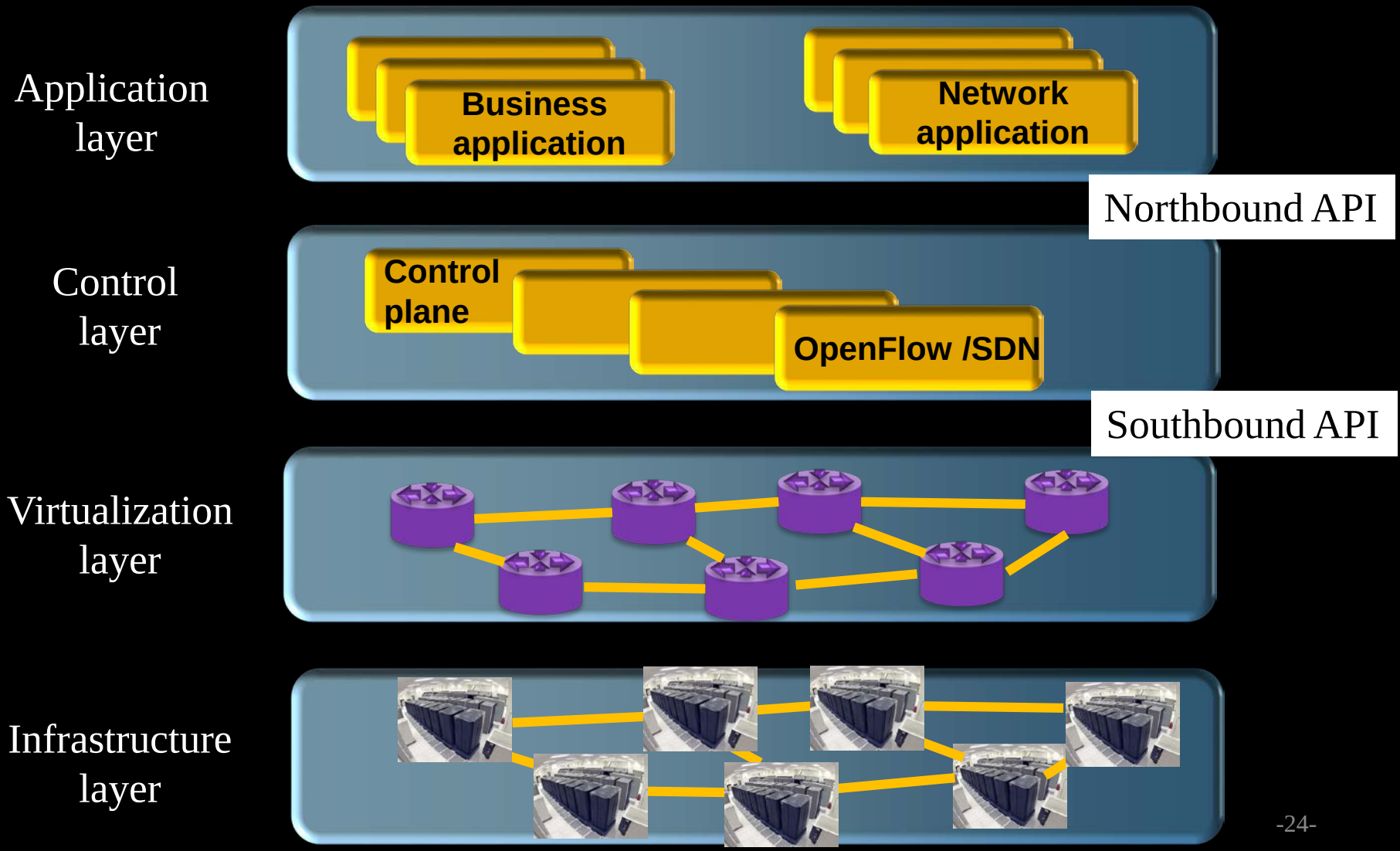
Customization
of control schemes

# Virtuor Access Box

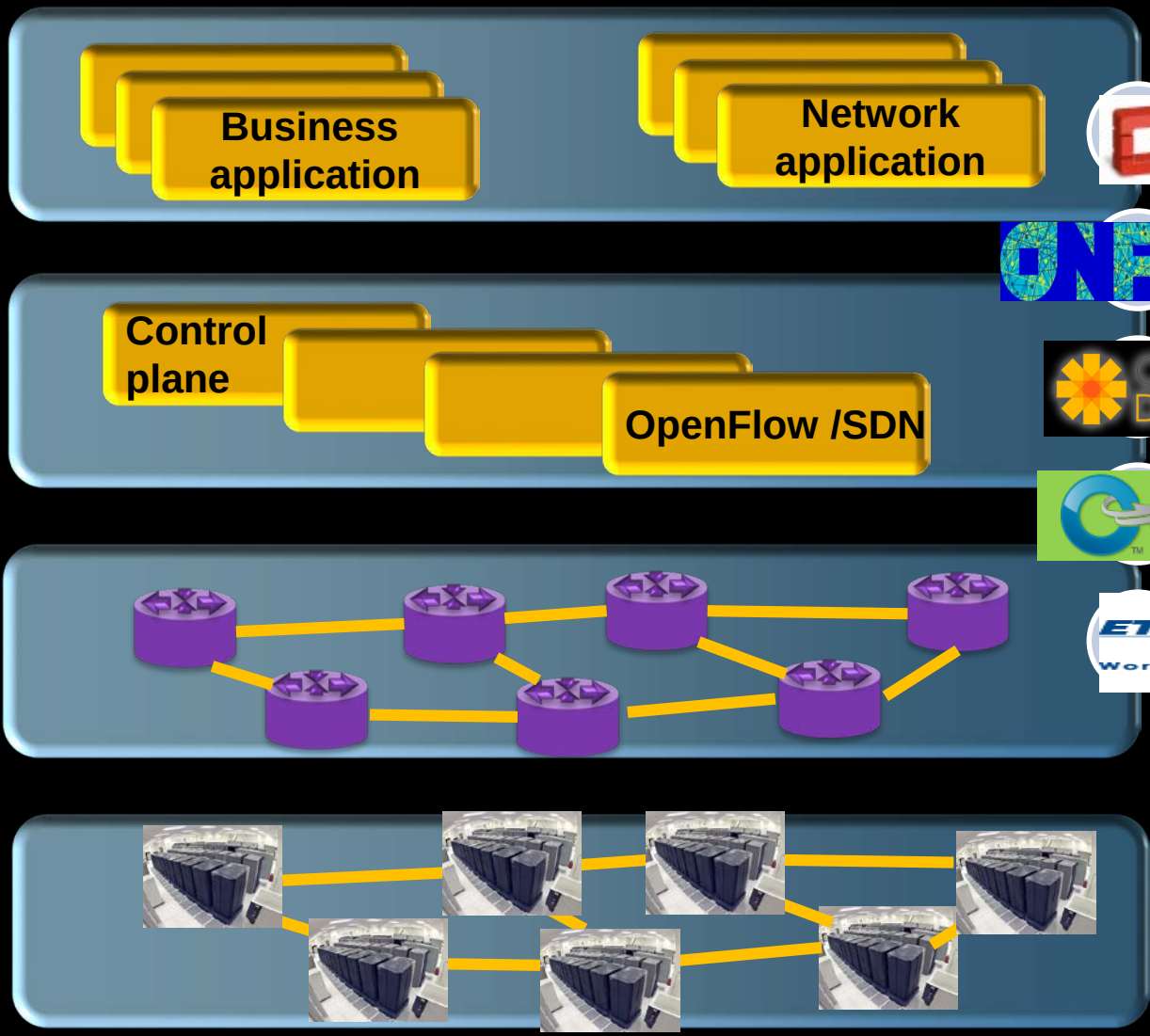
100 virtual machines, 8 virtual OpenFlow APs

# Cloudifying the network

# Network architecture



# Network architecture




openstack CLOUD SOFTWARE — Open stack

ONF OPEN NETWORKING FOUNDATION — Open northbound

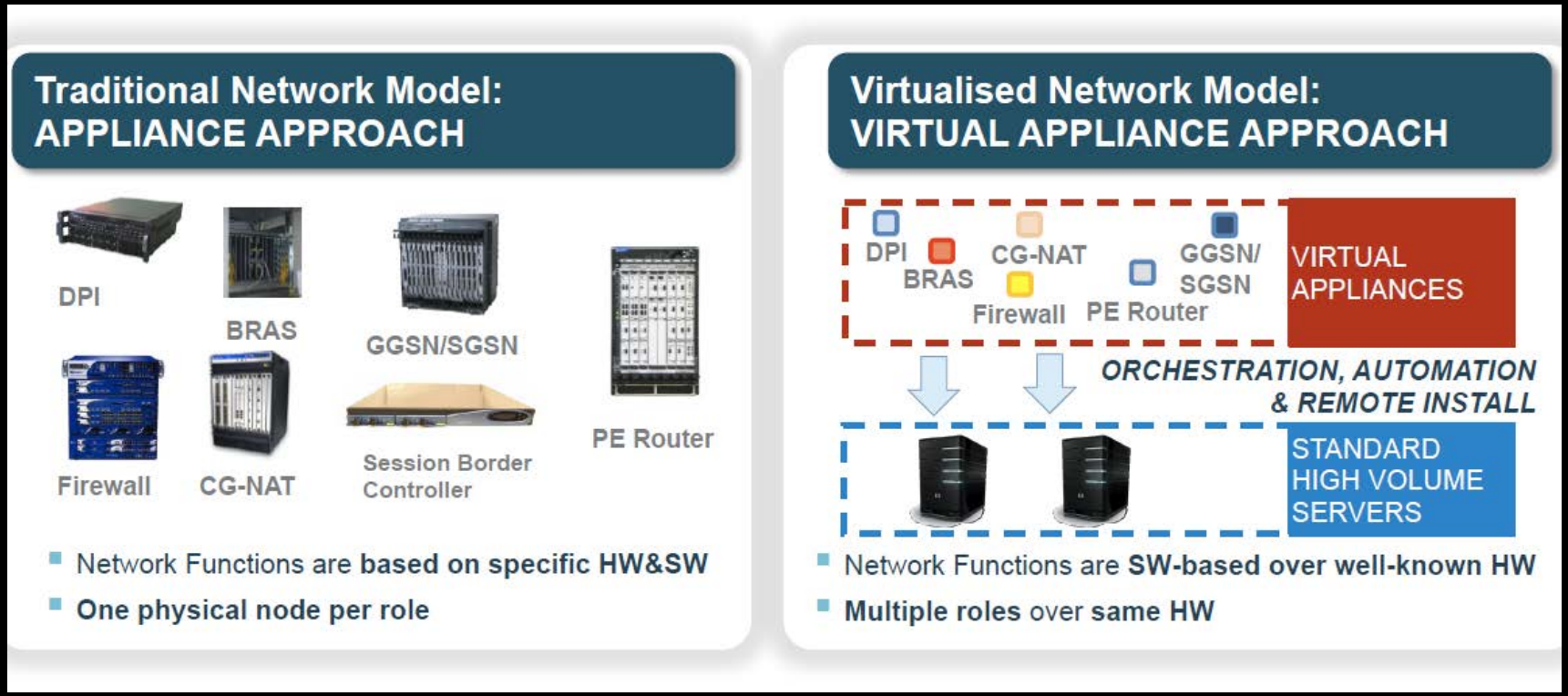
OPEN DAYLIGHT — Controller

OpenFlow — Open outhband

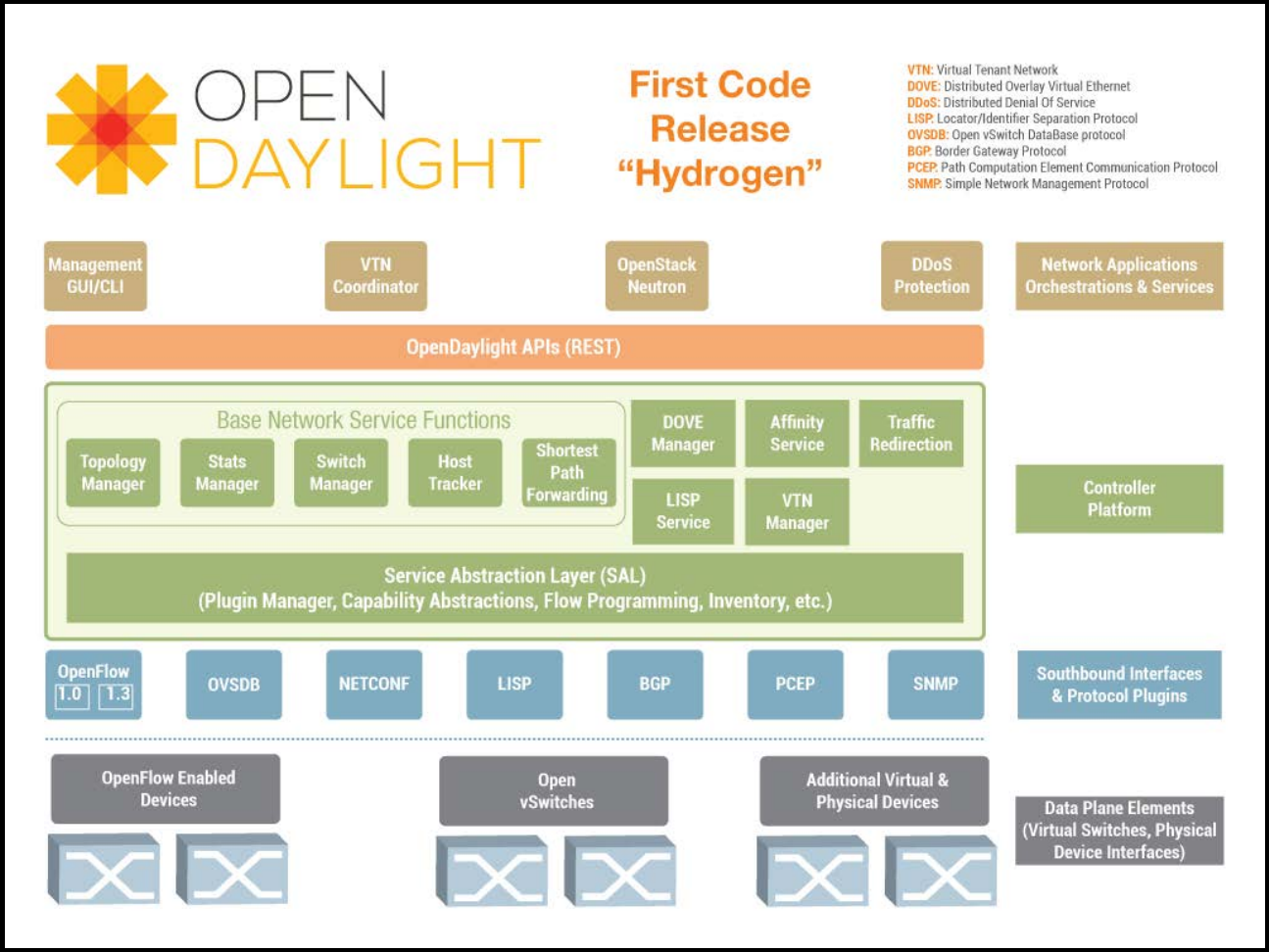
ETSI World Class Standards — NFV

# Decoupling network functions

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

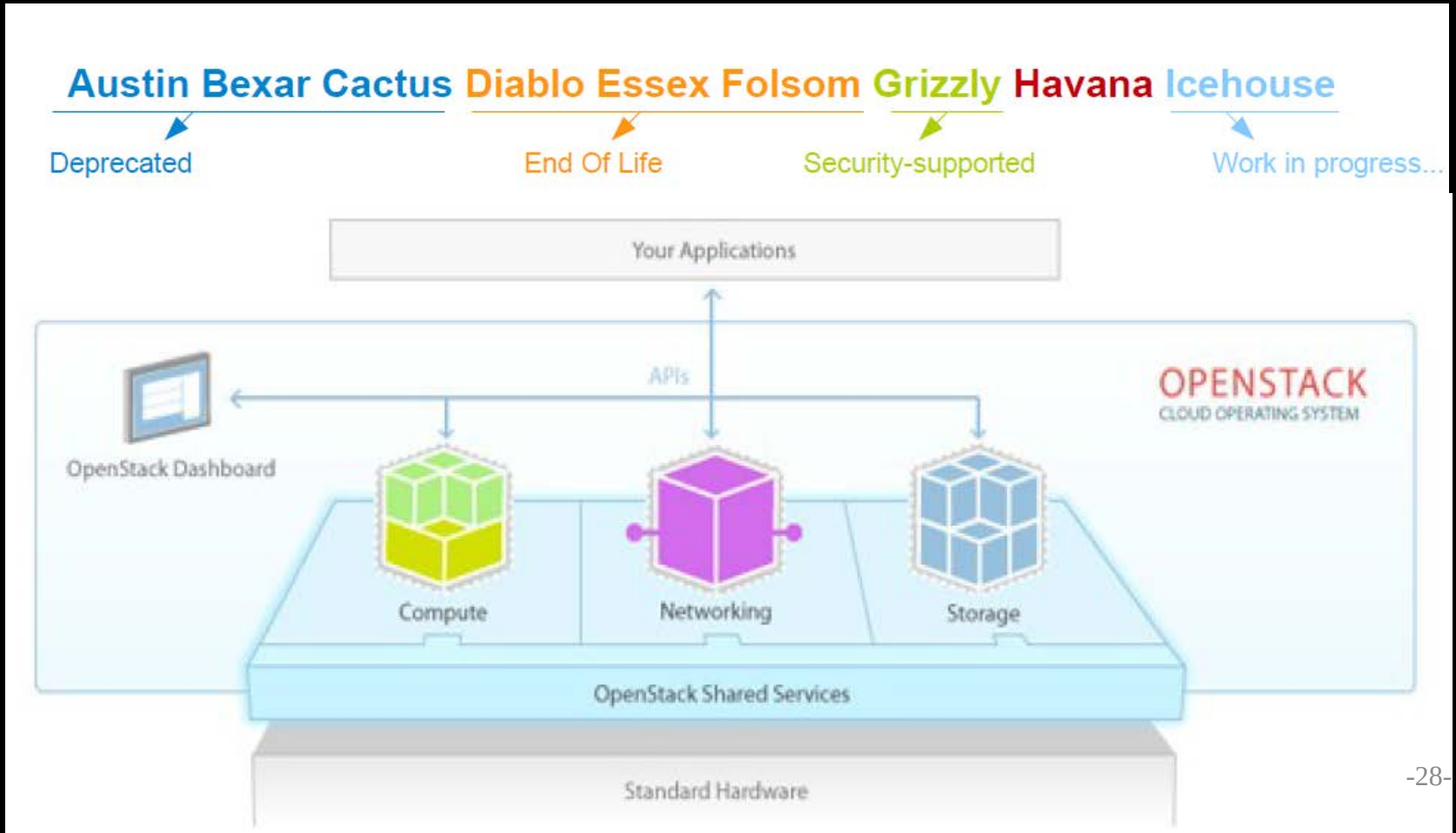


# Open Daylight

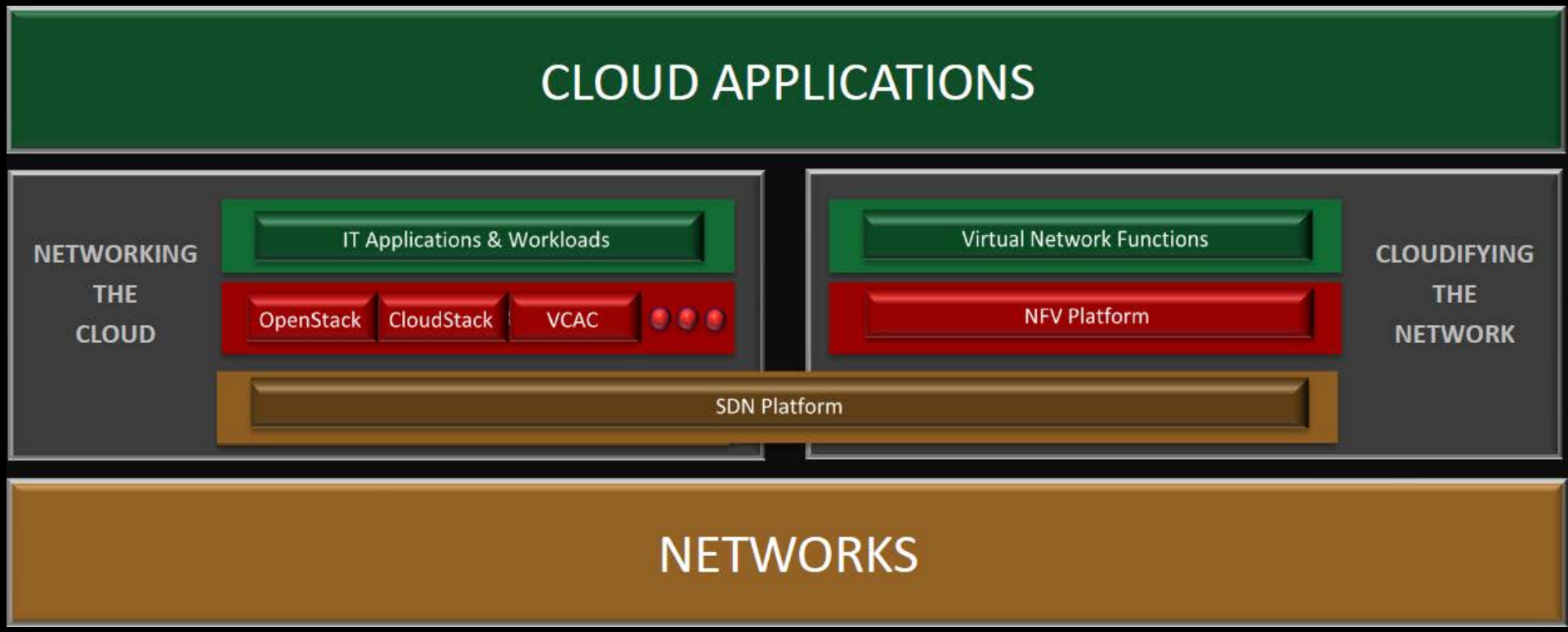


# OpenStack

- 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