

WACREN 2016

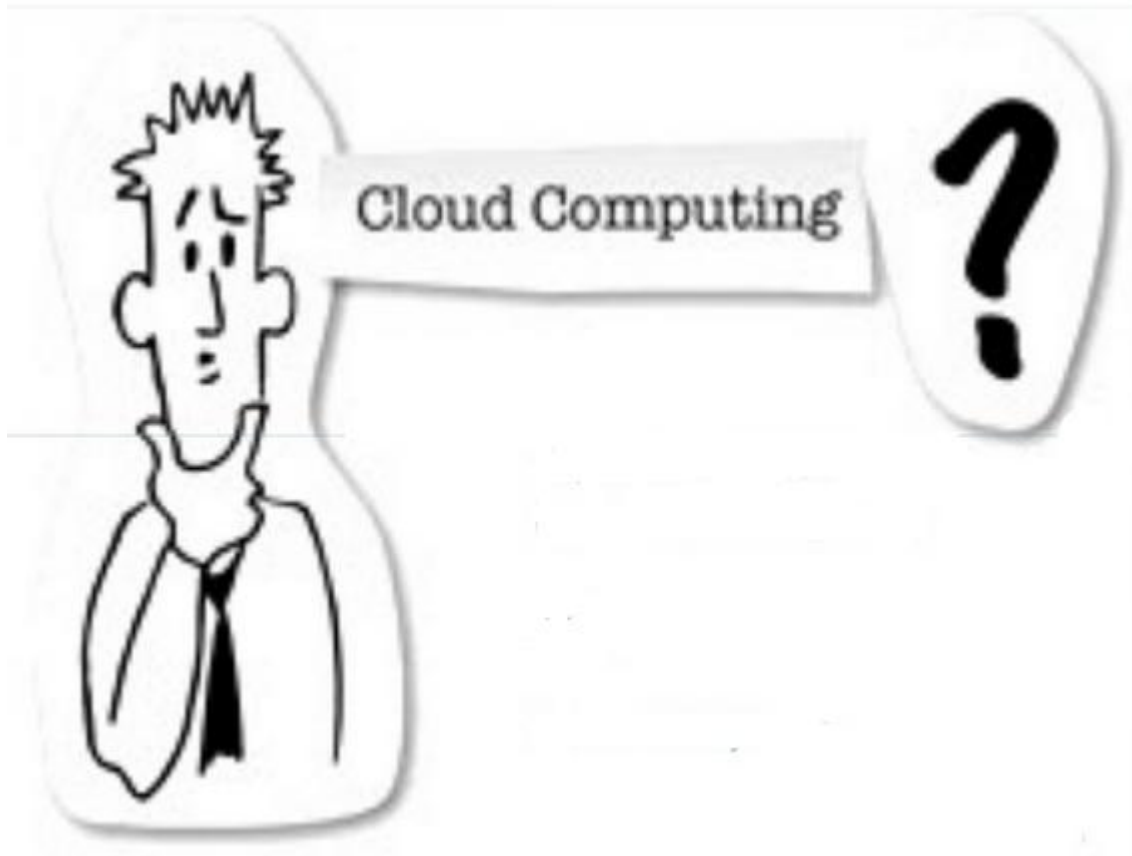
Cloud Infrastructure, an essential component of
resource sharing for African National Research
and Educational Networks

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Agenda :

- Cloud Computing
- Proposed WACREN Core Network
- Proposed WACREN community Cloud
- Benefits of Community Clouds
- NREN end-user use case

NREN Cloud Computing ?

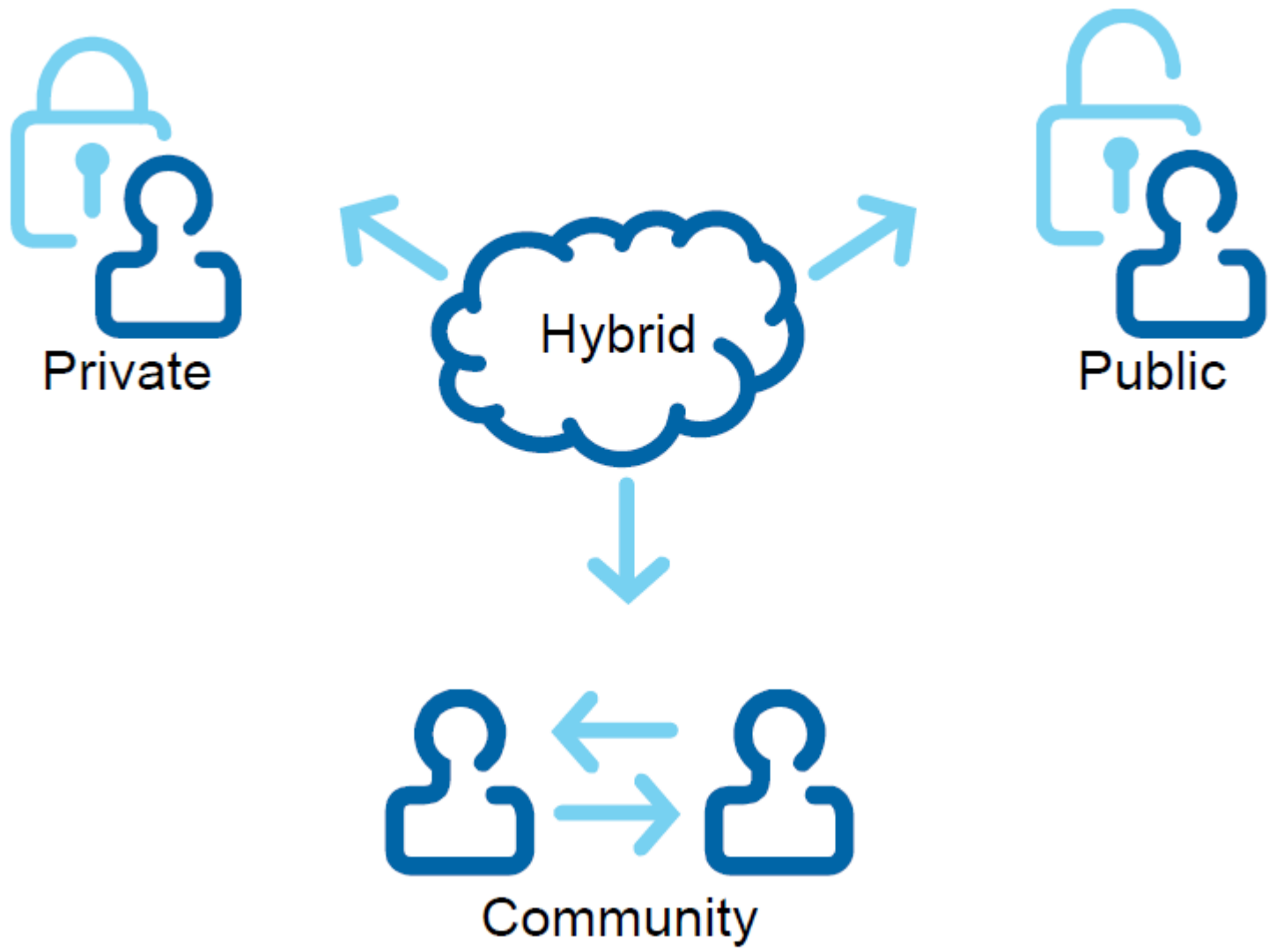


Cloud Computing - Definition:

Cloud Computing can be described as:

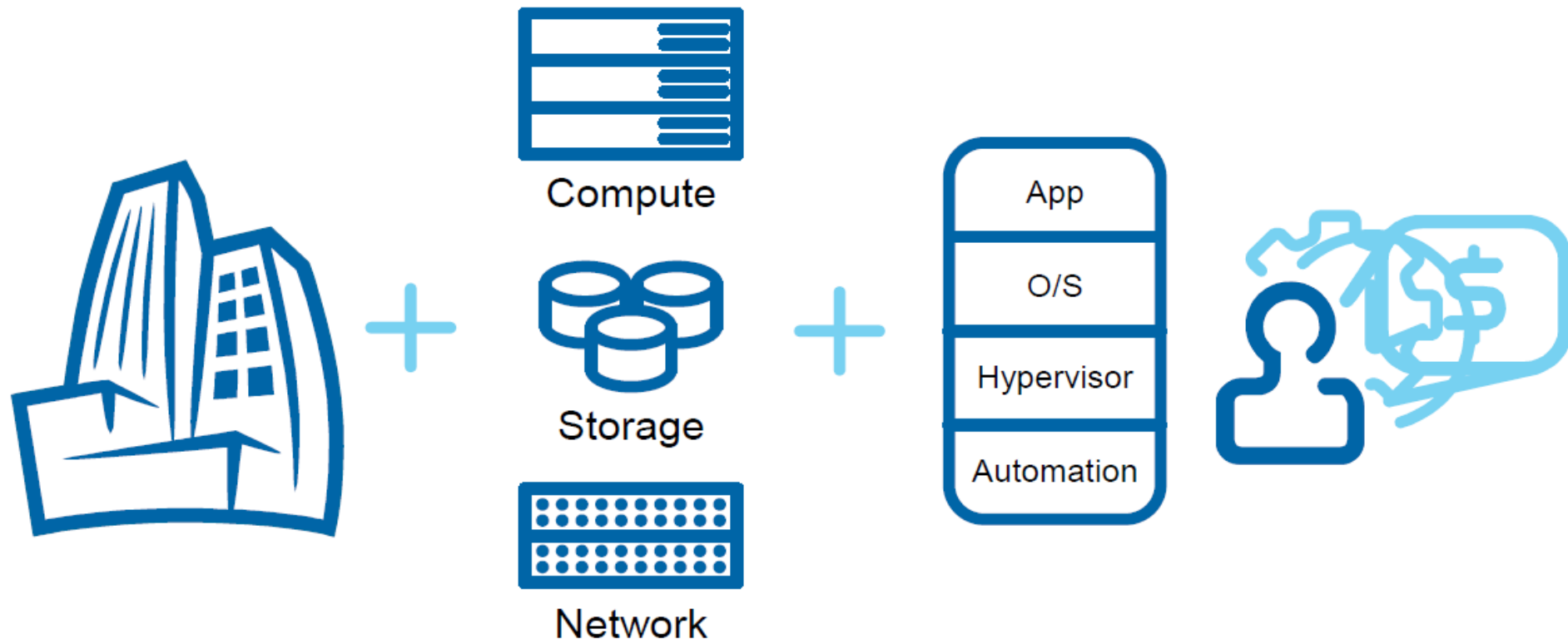
- a new way of consuming and delivery of **IT services** based on network connectivity (internet/intranet) and typically involves the provision of dynamically scalable and often virtualised resources as a service over a network connection.

Cloud Types:



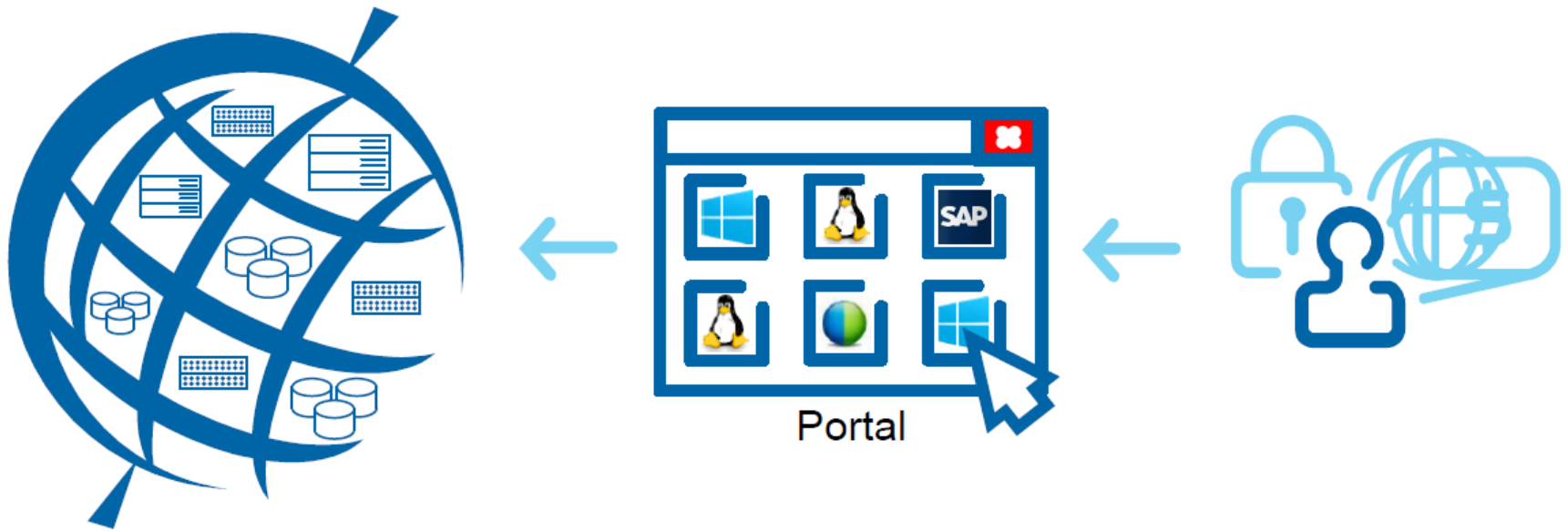
Cloud Types – Private Cloud:

- Cloud infrastructure deployed in-house (on-premise) within Organisation data centres
- IT services are managed and provided within the organisation.



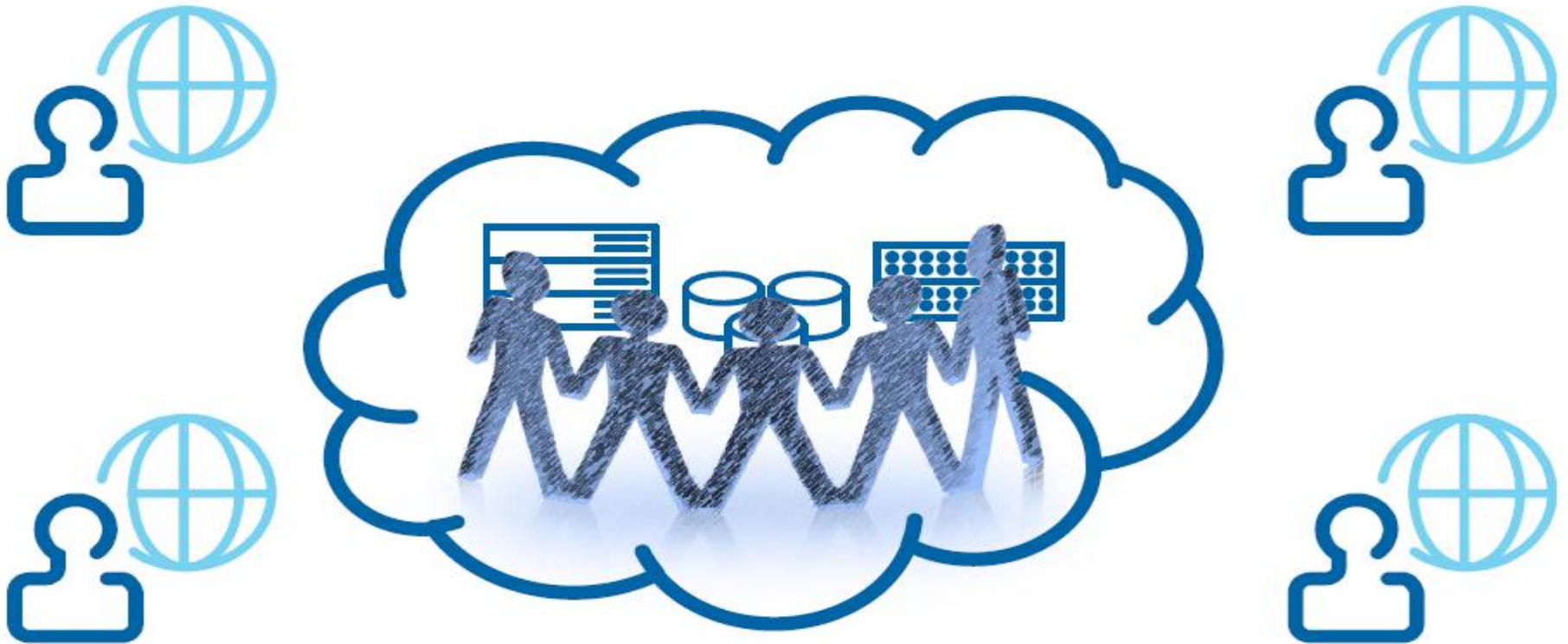
Cloud Types – Public Cloud:

- Cloud infrastructure deployed by a cloud service provider
- IT services are delivered to end user via the internet.



Cloud Types – Community Cloud:

- Cloud infrastructure deployed by a group of organisations with a common goal – on or off premise
- IT services are delivered to end user via the internet or the interco between the organisation's network.



Cloud Types – Hybrid Cloud:

- Combination of services provided from different cloud infrastructure types e.g DevOps & QA on private cloud, Prod. on Public Cloud.



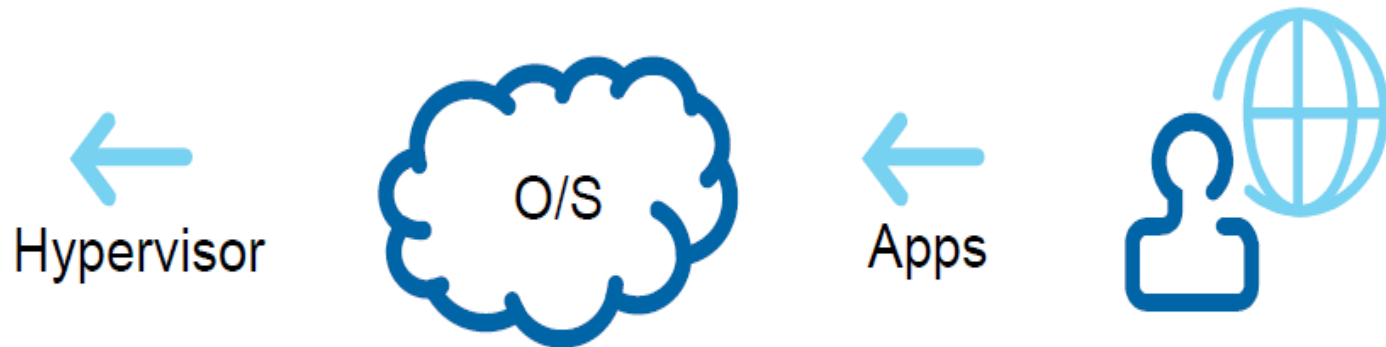
Cloud Services - Types:

Cloud Services – are as XaaS model, below are the major cloud services:

- IaaS
- PaaS
- SaaS
- DaaS – Virtual desktop e.g Amazon Workspaces, VMware Horizon Air, Citrix XenDesktop
- NaaS – connectivity with CDN e.g Akamai, Limelight

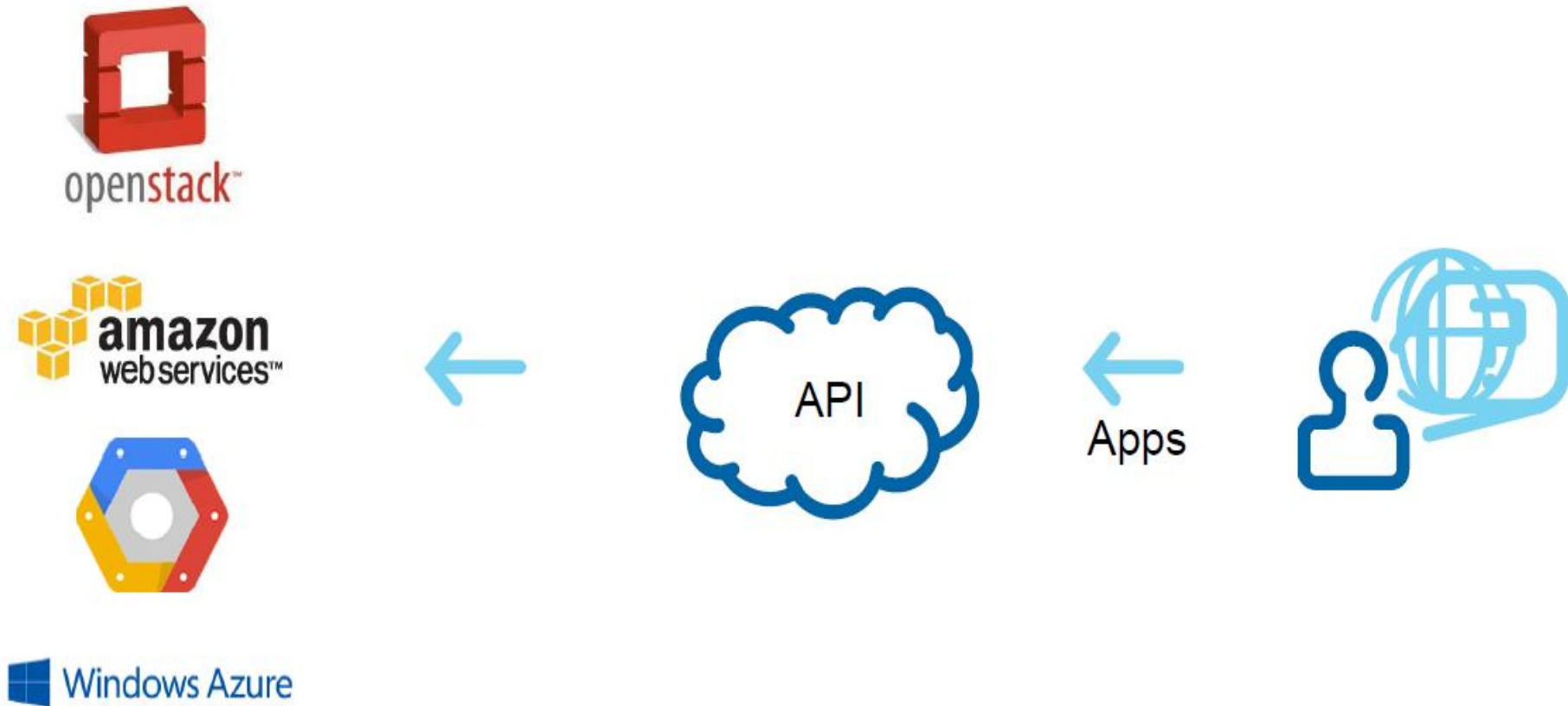
Cloud Services - IaaS:

- IaaS – utility computing data centre providing on demand server resources e.g Amazon AWS, Rackspace, HP Adaptive etc



Cloud Services - PaaS:

- PaaS – hosted application environment for building /deploying application e.g Amazon EC2,Salesforce.com, Microsoft Azure etc



Cloud Services - SaaS:

- SaaS – applications made available via browsers
e.g Google Apps, Salesforce.com



Common Cloud Characteristics :

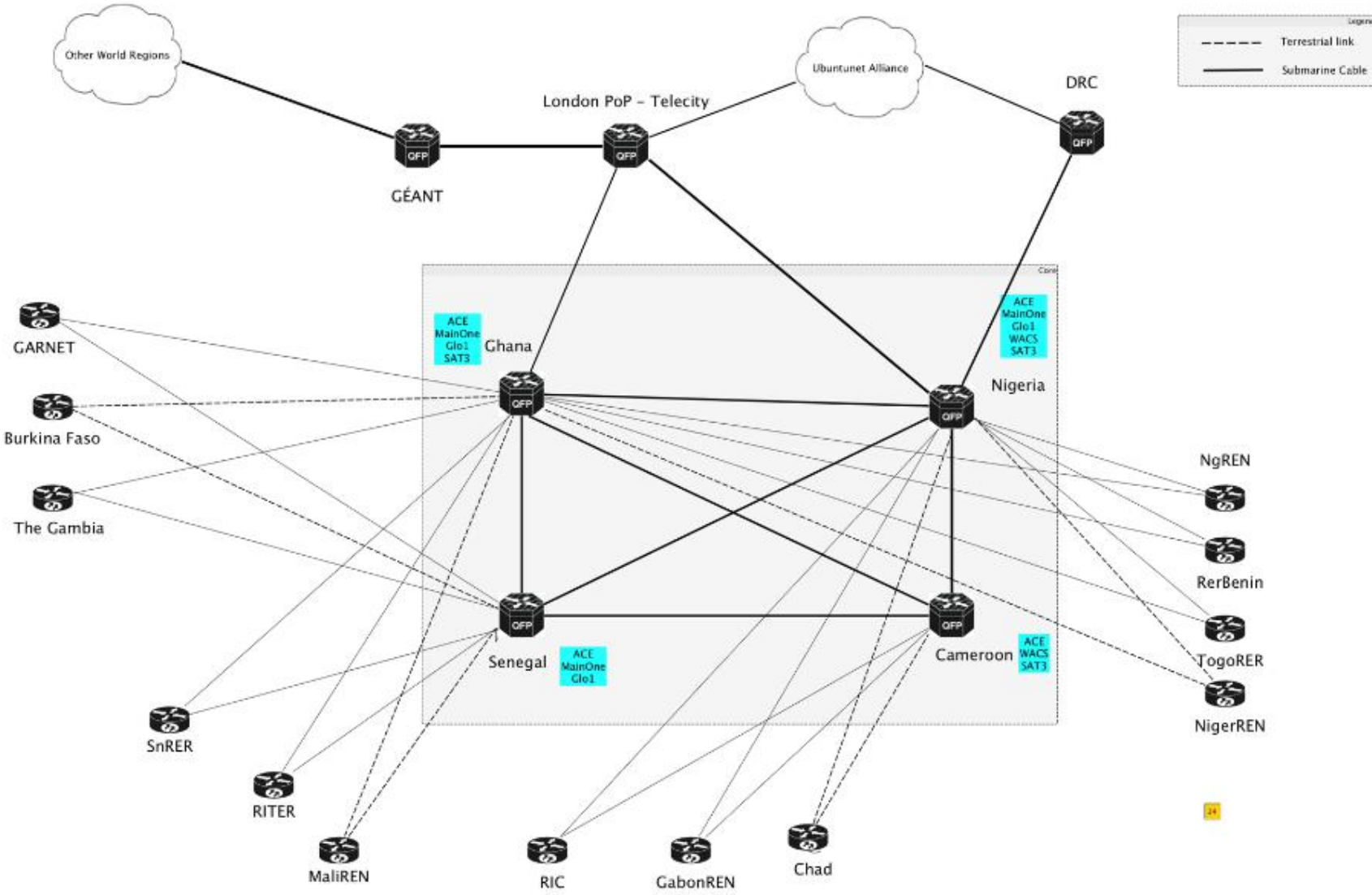
- On demand self services
- Multi-tenancy
- Rapid Elasticity – scalability
- Location independent resource pooling
- Ubiquitous network access – any time, any device, any where.
- Cost - Pay as consume, PAYG (Pay as you Go)

Proposed WACREN Community Cloud

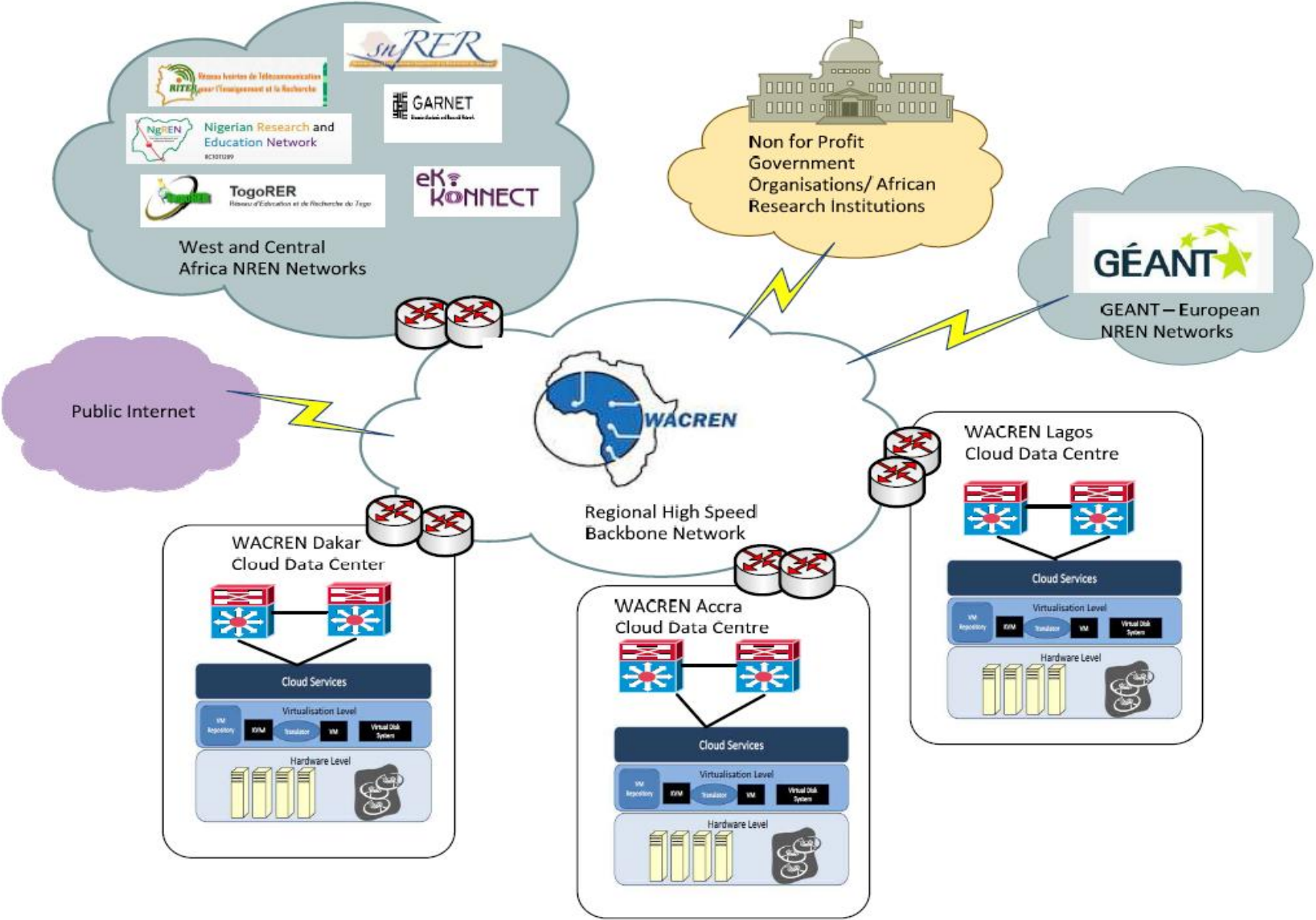
WACREN community cloud Infrastructure:

- Core high capacity BB network (interconnect NRENs to WACREN cloud)
- Next Generation Data Centres (NGDC)
 - Physical Hardware – Storage, Compute & Network
 - Virtualization
 - Management
 - Workloads

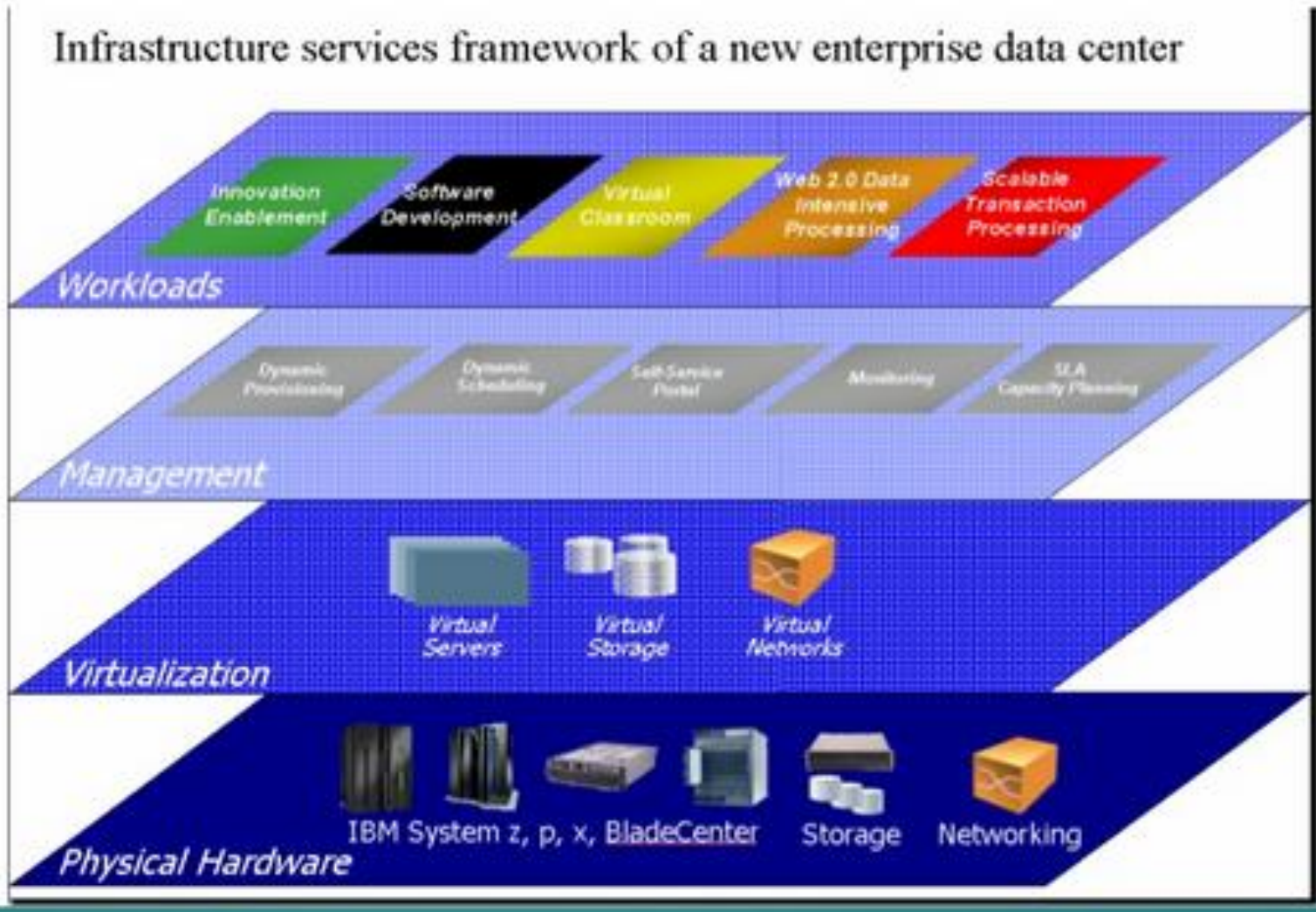
Proposed WACREN Network:



Proposed WACREN cloud +network:



Services Framework for NGDC:



NGDC Physical infrastructure 1/2:

VersaStack

FlexPod

Vblock

VSPEX

HDS UCP
Select

SmartStack

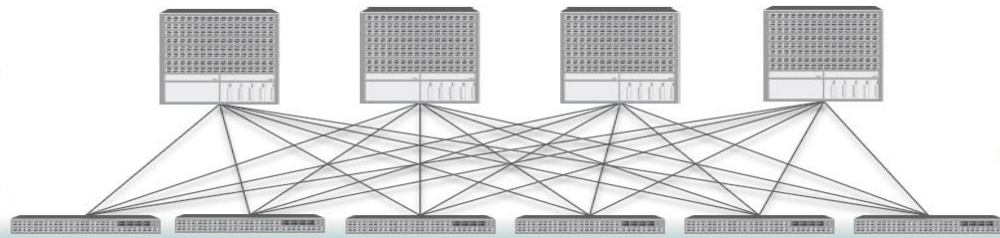
UCS for Red
Hat
OpenStack



Compute & Storage

ACI Spine Nodes

ACI Leaf Nodes



Application Policy
Infrastructure
Controller

SDN for Cloud Data Centres

Cisco
UCS



UCS Director



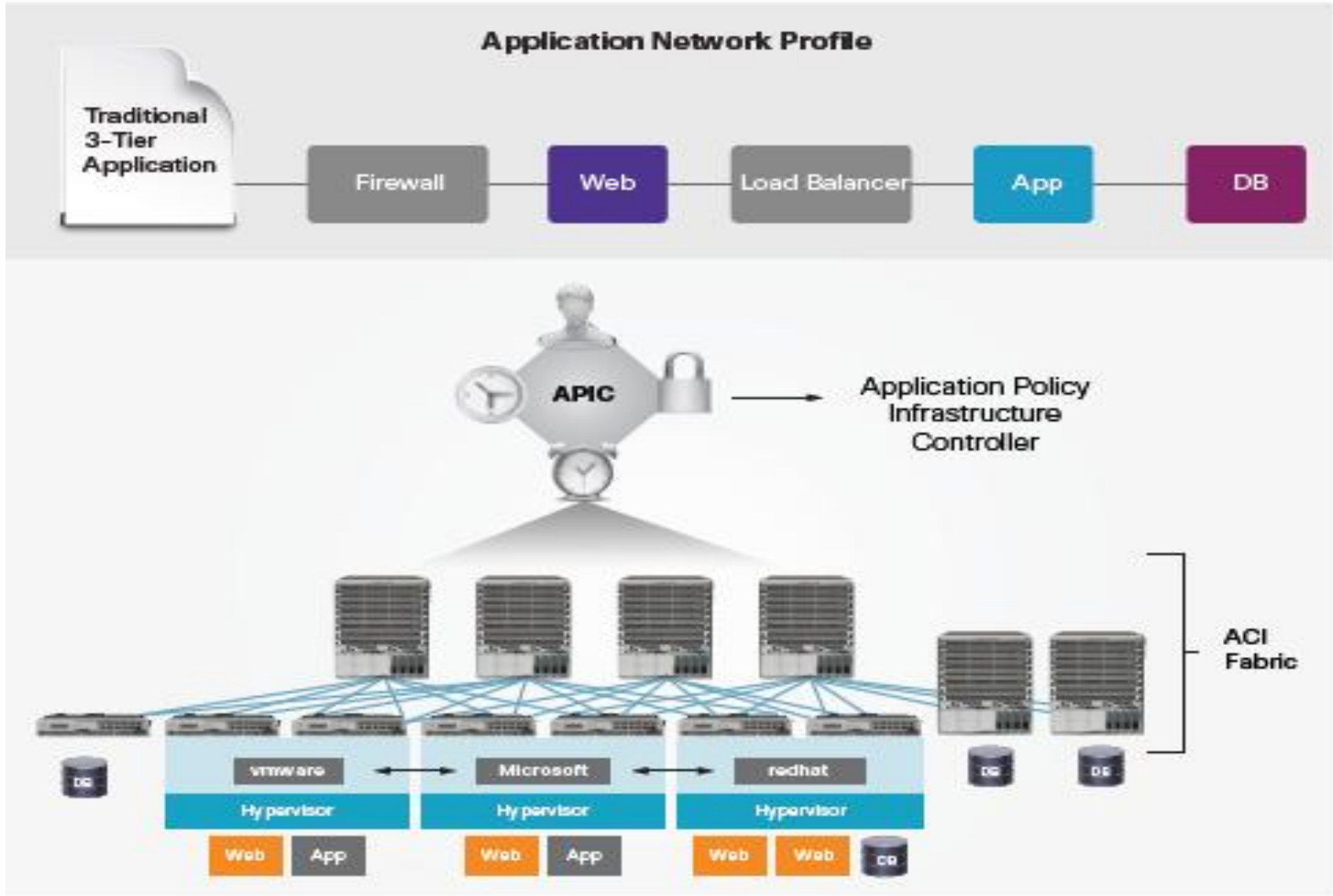
Cisco
Nexus



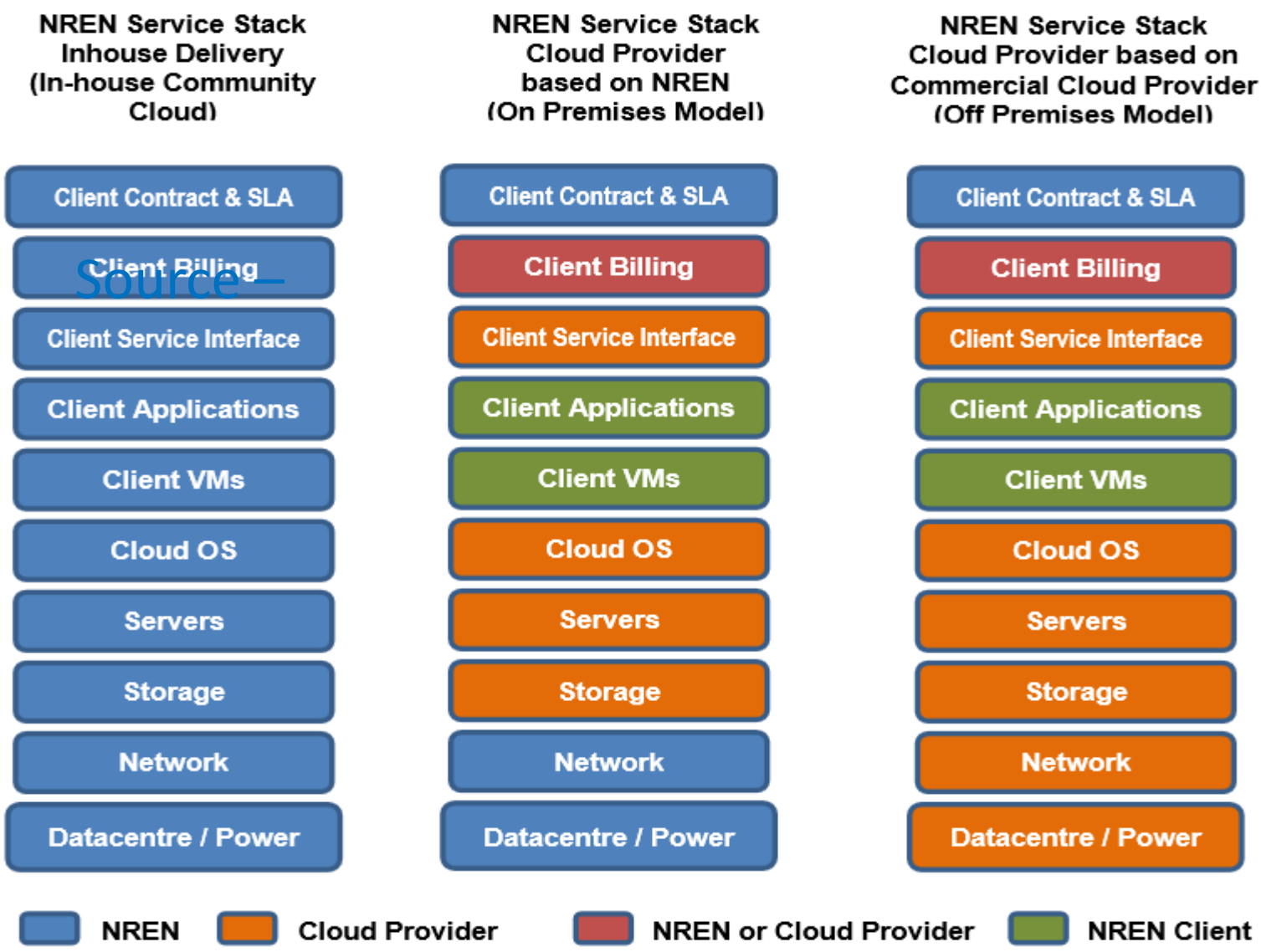
UCS Integrated Infrastructure

Automation & Orchestration

NGDC Physical infrastructure 2/2:



Proposed Cloud stack ownership:



Source -

Use case & Benefits to NREN's

Benefits :

- Cost effective – savings on OPEX and CAPEX for NRENs
- Easy and fast deployment (Agility)
- More scalable and flexible
- Ease use and access
- Business continuity
- Internal IT transformation
- On demand self services
- Multi-tenancy
- Energy efficient

Use case : XYZ university

- Runs main University website, research project websites and main teaching hospital websites.
- 15 academic faculties
- Over 35,000 students (Full, Part-time & Online)
- Over 1,200 academic staff & 700 non-academic staff
- Affiliate of XYZ teaching hospital
- 5 research centres – Physics, Engineering, Medicine etc
- Main university Library with 13 dept. libraries

Use case : XYZ university IT services

- Hosts the University website, faculties and departmental websites, research project websites and teaching hospital websites in the Universities vDC (virtual Data centres) on the WACREN cloud
- Host and provide Email and IM services to over 35,000 students and staff with BYOD- anywhere, on any-device.
- Host and Provide e-learning/virtual classrooms to distance learning students
- Provide DaaS service for all academic and non academic
- Support the IT services for the Teaching Hospital
- Provide IT requirements for research centres and faculties – HPC, PaaS, SaaS etc
- Host and maintain a digital online libraries for university library and dept. libraries

Cloud Services and NREN end-user:

- Centralised AAA for single sign on services across IT infrastructure
- DHCP – centralised DHCP for Universities Wireless or Wired network in vDC
- DNS – centralised DNS services in the vDC on WACREN cloud
- Inter-cloud connectivity to public clouds – Google Apps for Education, Microsoft etc
- Cost effective – savings on OPEX and CAPEX for NRENs
- PaaS – e.g for Apps development – Computer Science students, Research projects etc.
- SaaS – Application disseminations e.g Anti-virus , MS office or other Business Apps that can be downloaded by the university or research community.
- IaaS – vDC's with VMs to host websites, Apps – Messaging & Collaboration tools, other University and business apps
- HPC – High Performance Computing for research projects etc
- Storage – Academic records, Admission records, Library archives , Research Projects etc
- DaaS – for remote desktop services etc

Thank You

Further reading :

- <http://services.geant.net/clouds/Pages/Home.aspx>
- <https://net.educause.edu/ir/library/pdf/erb1413.pdf>
- <http://services.geant.net/clouds/Activities/Documents/StrategyFrameworkDocs/NREN%20Cloud%20Strategy%20Guide%20final.pdf>