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The Feasibility of Using Multi Access Edge Computing (MEC) to Service Unserved Rural Areas

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Agenda

1. Overview of the Sub Saharan Region
2. Challenges – generic and regional specific
3. Benefits of Software Centric Networks
4. Multi Access Edge Computing (MEC)
5. High level architecture
6. Business Model
7. Advantages
8. Conclusion

Overview of the Sub Saharan Africa Region

- **23.62 million km^2**
- **52 Countries**
- **1.03 billion people (2016 – 2.72% growth)**
- **43.75 people/km^2**
- **GDP per capita: US$1467.33 (2016) (-1.44%)**

Overview of the Sub Saharan Africa Telecommunications Statistics

Telecommunication Statistics

- **710 million mobile subscriptions**
- **940 million mobile subscriptions forecasted for 2024 (5% CAGR)**

- **410 million mobile broadband subscriptions**
- **820 million mobile broadband subscriptions forecasted for 2024 (12% CAGR)**

- **340 million smart phone subscriptions**
- **690 million forecasted for 2024 (13% CAGR)**

- **Mobile data traffic: 0.54 EB/month**
- **5.2 EB/month forecasted for 2024 (46% CAGR)**

ERICSSON **Mobility Report November 2018**

Un-serviced Population

	2018 (millions)	2024 (millions)	Penetration 2024
Mobile Subscriptions	**710**	**940**	**91%**
Mobile Broadband Subscriptions	**410**	**820**	**80%**

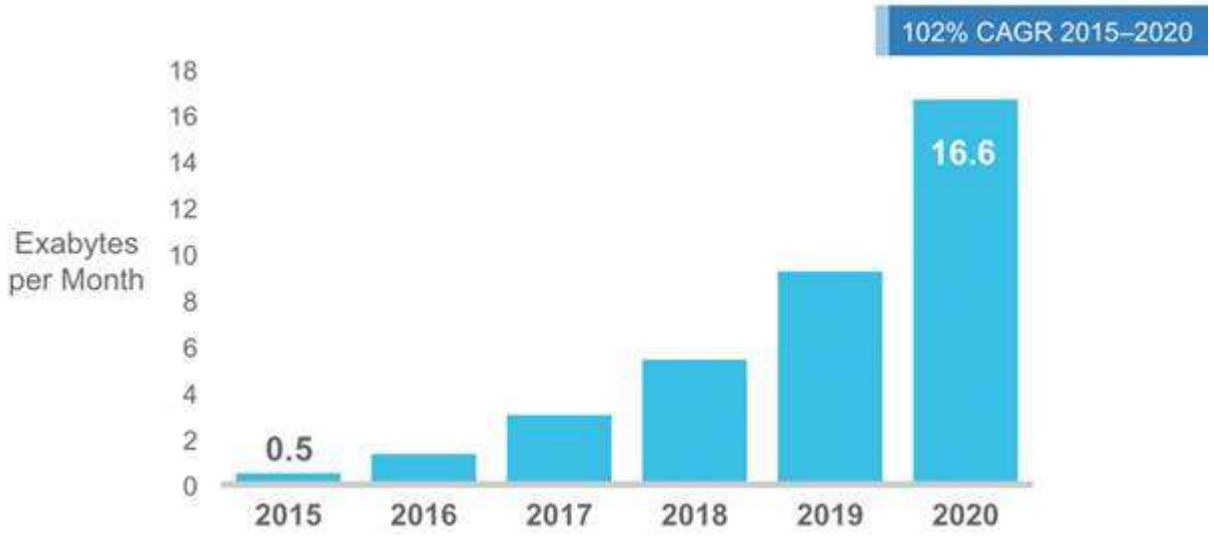
How can the use of Software Centric technologies (SDN & NFV) assist in effectively serving the un-served market in Sub Sharan Africa?

Challenges Faced by Telecommunication Operators – Generic and Africa Specific

Generic Challenges

1. Massive growth in data, especially mobile:

- **Everything is going mobile**
- **Ubiquitous coverage and speed (60% population coverage by LTE in 2018)**
- **Growth in mobile subscriptions**
  - **7 billion by 2017**
  - **50 billion by 2020 including M2M**
- **Growth in the use of Smartphones (3 billion by 2017)**
- **Video traffic (streaming video currently 70% of web traffic)**



Source: Cisco Visual Networking Index

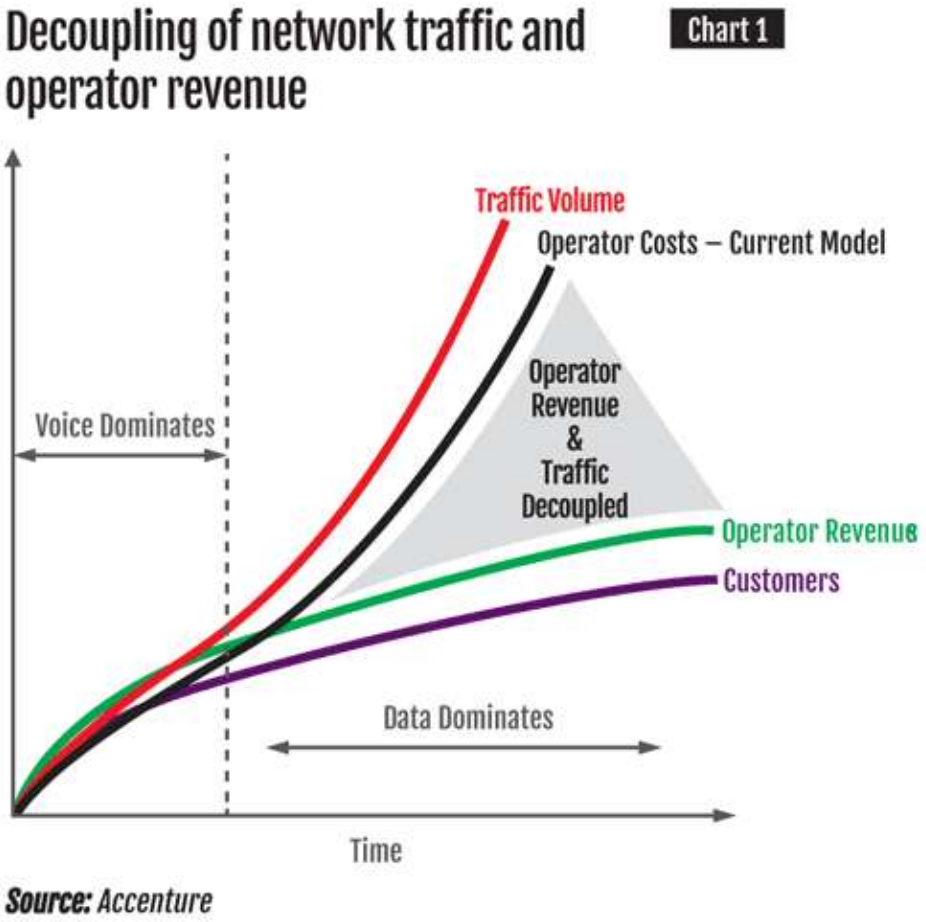
Generic Challenges (cont.…)

2. Data growth versus revenue growth conundrum

- **Mobile services are moving from being voice dominated to data dominated**
- **As customers are demanding lower rates for data a gap is developing between the amount of traffic being carried versus revenue earned.**

3. Threat of OTT operators

- **Generating massive amounts of traffic without incurring capex**
- **Owning the end customer**



African Specific Challenges

- Low fixed network baseline spurring significant high growth in mobile
  - 35% growth predicted for Middle East and Africa between 2015 and 2021
- Limited national, regional and metro transmission networks
  - International bandwidth was 4.5Tbps in December 2015
  - Africa's terrestrial transmission network reached 1 million km in 2015
  - 91 182 km of metro/FTTH/FTTB
  - Although international connectivity has significantly increased, national, regional and especially metro and access connectivity is still far below that which is required for a Continent this size

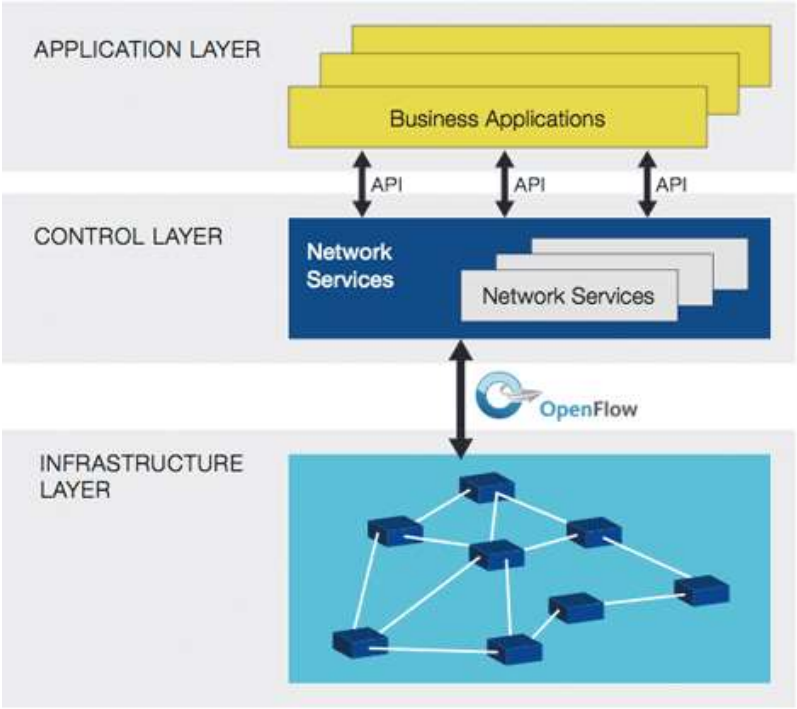
- Limited "on-grid" power availability
  - Mobile networks in Africa have grown beyond the reach of reliable grid electricity
    - 145 000 off-grid sites expected to grown to 189 000 sites by 2020
    - 84 000 bad-grid sites expected to grow to 100 000 sites by 2020
    - Typical tower site consumes 40% of opex spend energy

- Limited technical skills

Software Defined Networking (SDN)

SDN takes the control plane (how a network device forwards traffic) and separates it from the data or forwarding plane (a network device that forwards traffic based on the control plane policy)

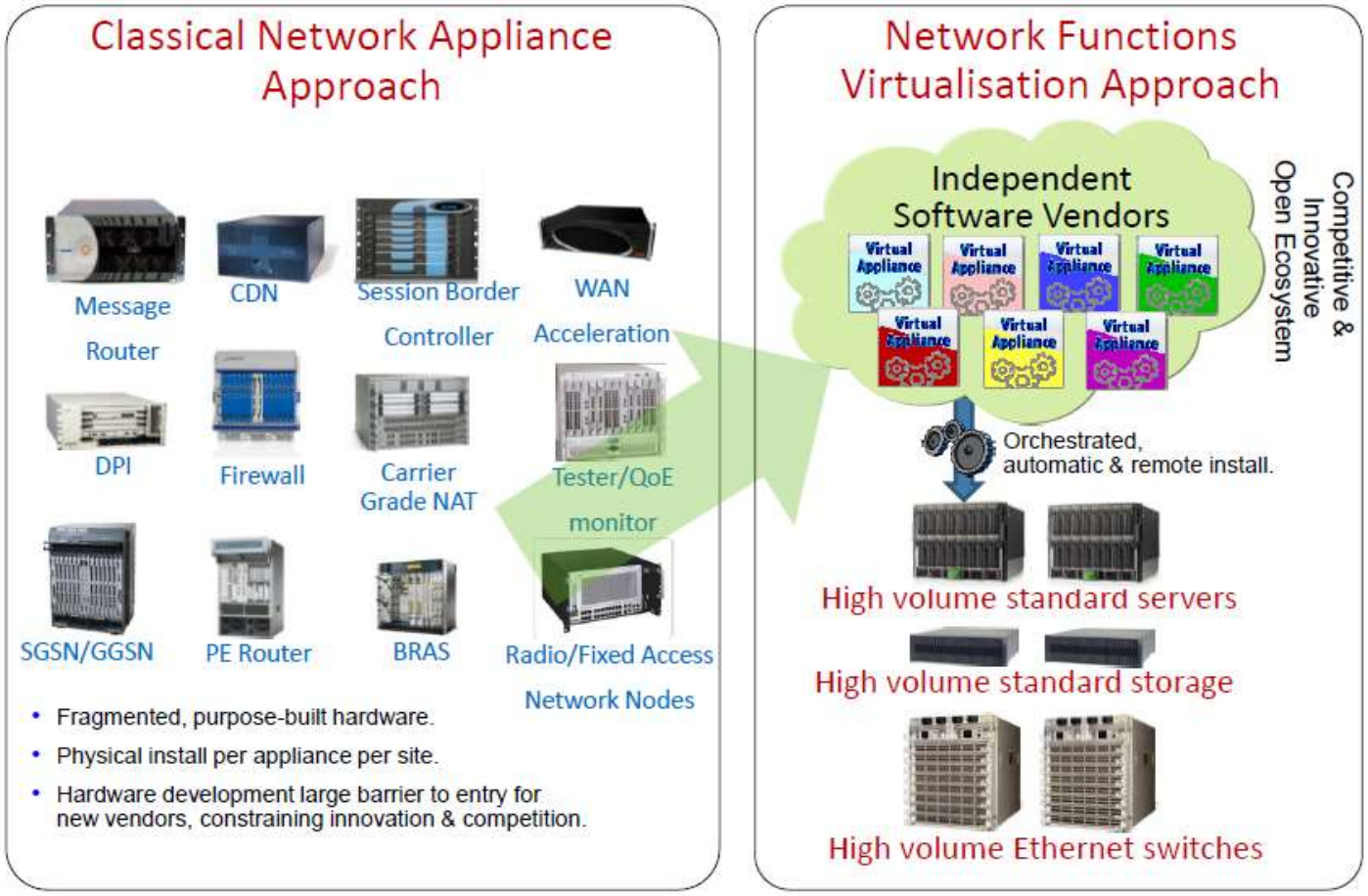
- Separated control plane resides on a centralized controller
- Allows network engineers to implement unique and flexible forwarding policies which are limited only by the ability of the software running on it
- Controller acts as an arbiter, abstracting the underlying physical network topology from the applications that program them



Network Functions Virtualization (NFV)

- NFV is about implementing network functions in software that today run on proprietary hardware, leveraging (high volume) standard servers and IT virtualization
- Supports multi-versioning and multi-tenancy of network functions
    - Allows use of a single physical platform for different applications, users and tenants
- Enables new ways to implement resilience, service assurance, test & diagnostics and security surveillance
- Facilitates innovation towards new network functions and services that are only practical in a pure software environment
- Applicable to any data plane and control plane functions, fixed or mobile networks
- Automation of management and configuration of functions important for NFV to scale
- NFV aims to ultimately transform the way network operators architect and operate their networks – though change will be incremental

NFV Approach vs. Physical Approach



Benefits of Deploying Software Centric Networks

Flexibility & Agility

- Functionality and capacity spun up minutes rather than installed in weeks/months
- Rapid and dynamic provisioning of new services
- Reduces time to market

Orchestration & Automation

- Automating end-to-end service provisioning
- Lowers need for large numbers of technical and administrative staff
- Reduces order to cash time

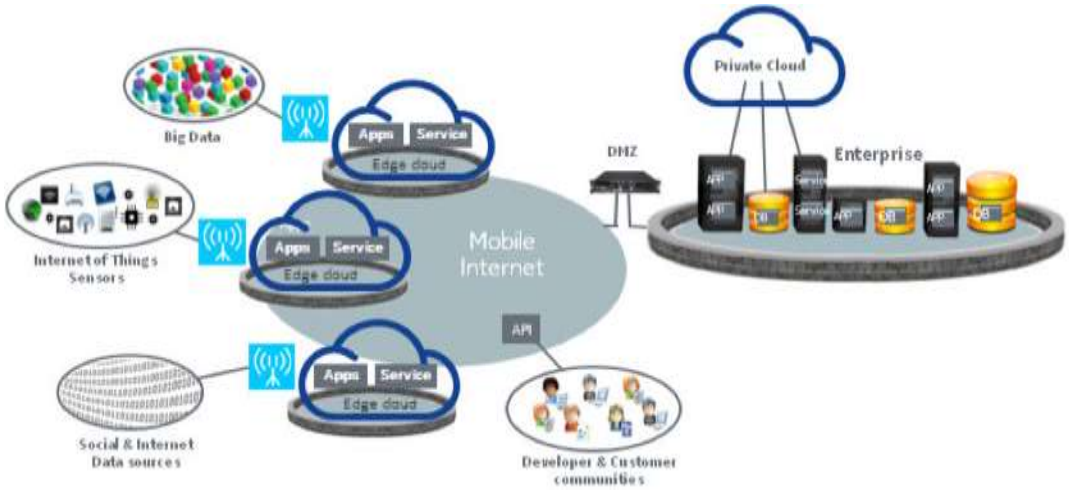
Lower Capex & Opex

- Reduced equipment cost through use of high volume industry standard servers, routers and switches (economies of scale)
- Improved operational efficiency
- Reduced operational costs – power, floor space, improving monitoring and control
- Removing vendor lock-in

Multi Access (Mobile) Edge Computing (MEC)

MEC is a cloud based IT service environment at the edge of the network:

- **Brings real-time, high-bandwidth, low latency access to radio network information**
- **Allows operators to open their networks to new ecosystems and value chains**
- **Permits multiple types of access at the edge, including wireline**



Primary goals:

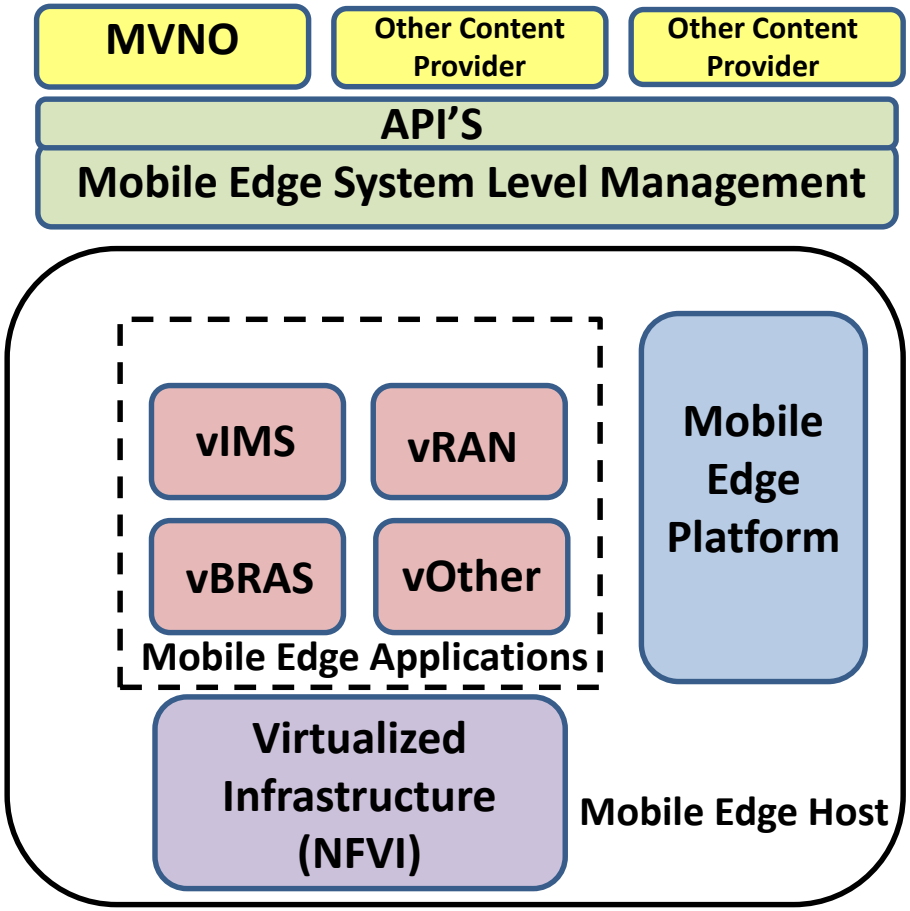
- **Reduce network congestion**
- **Improve application performance by carrying out task processing closer to the user**
- **Improve the delivery of content and applications to the users**

- **Key use cases:**
  - **VR & AR – lightning fast response times and low latency**
  - **Connected car – high-bandwidth, low latency, high availability**
  - **IoT – high performance and smart utilization of network resources**

History of MEC

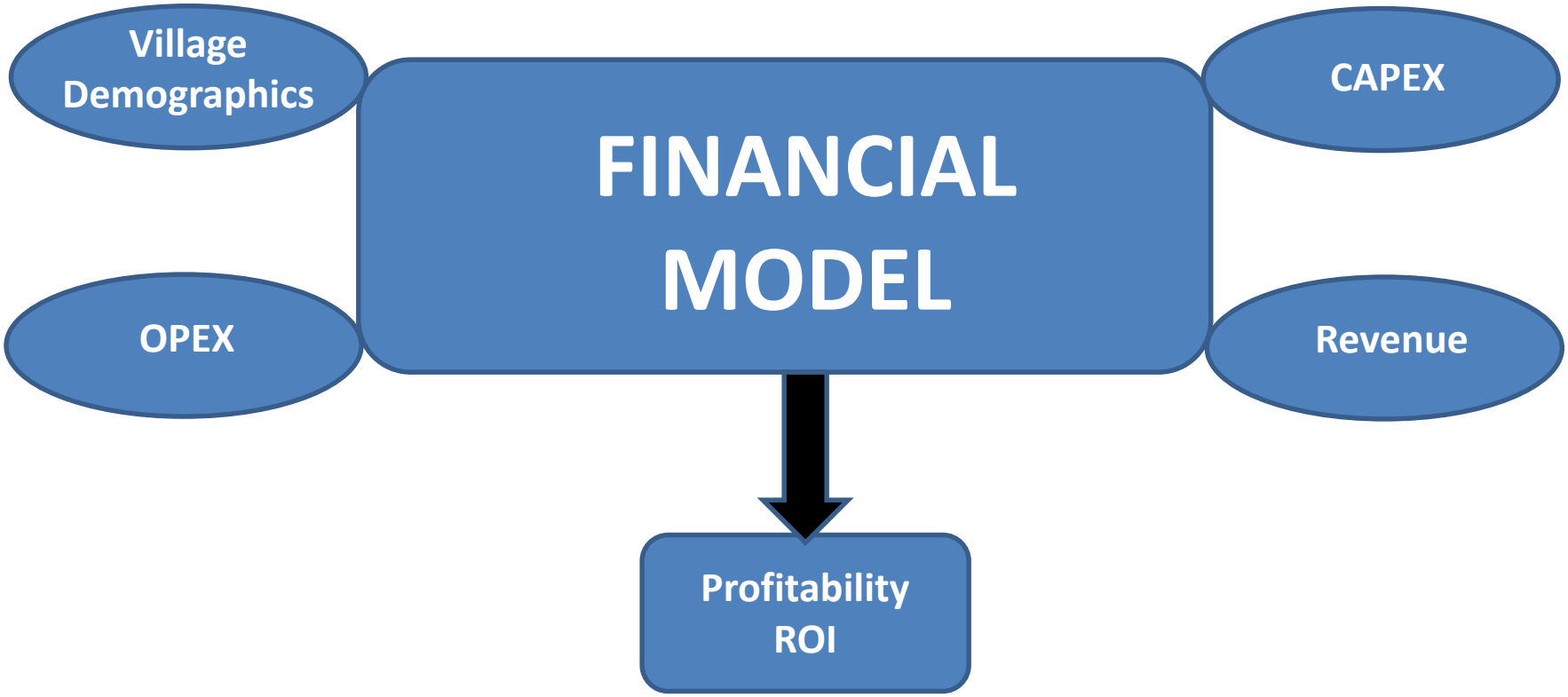
- Started life out as Mobile Edge Computing (MEC) with the objective of providing IT and cloud-computing capabilities within the Radio Access Network (RAN) in close proximity to mobile subscriber
- Was the subject of an ETSI White Paper “Mobile Edge Computing – Introductory Technical White Paper which was published in September 2014 and which covered the technical aspects, market drivers and benefits, both for business and consumer
- Name was changed to Multi Access Edge Computing when it was realised that the concept can be used for all access network types including fibre and other wireless networks
- ETSI MEC ISG (Industry Specification Group) was started to create a standardised and open environment to allow efficient and seamless integration of solutions and applications from vendors, service providers and third-parties across multi-vendor multi-access edge computing platforms
- Since inception a number of standards relating to MEC have been published by the ISG

High Level Architecture (Village)



4G Or 5G RAN

Business Model



Advantages

- **Generic drivers:**
  - **Agility and flexibility**
  - **Leveraging economies of scale with COTS**
  - **Lower capex and opex**
- **Using MVNO concept allows partnership with local entrepreneurs who can manage the marketing and commercial side of service delivery**
- **The use of a distributed MEC platform in each Village will reduce the amount of backhaul capacity required, normally a high cost for rural service delivery**
- **Opening the MEC platform to 3rd party application and service providers will further stimulate to the local village economy as well as ensuring that such services and applications are aligned to the local needs of individuals e.g. local peering with local information**
- **The ability to scale the solution to the demand for service – flexibility in varying the fixed cost**

Conclusion

- There is a strong belief that the benefits derived from deploying software centric network technology solutions can be used to effectively address the un-serviced market in emerging economies.
- It is also believed that the MVNO business model, implemented using software centric network solutions, can also be used to address the un-serviced market in emerging economies.
- The current study addresses these beliefs by drawing on the results of proof of concepts that are being conducted for SDN and NFV solutions, and using these results to develop a business case.