4G-LTE DEPLOYMENTS

- Global Market Trends
- Global 4G-LTE Deployment
- Sub-Saharan Africa Market Trends
- Sub-Saharan Africa 4G-LTE Deployments
- Deployment Strategies
- Case Studies

Global Mobile Market

- 2015 has been a year of continued growth in the mobile industry, with more than 7.6 billion mobile connections (representing 4.7 billion unique subscribers) and operator revenues of more than $1 trillion.
- The acceleration of 4G has been a major highlight; the global 4G connection base passed the 1 billion mark in late 2015.

Global Mobile Market

- The global subscriber penetration rate now stands at 63%, with regional penetration rates ranging from 43% in Sub-Saharan Africa to 85% in Europe.
- The overall subscriber growth rates continue to slow, due to saturation in developed markets and the difficulties of connecting low-income populations in developing markets.
- The global subscriber base will reach 5.6 billion by
- the end of the decade, by which point over 70% of the world's population will have a mobile subscription.

Global 4G-LTE Forecasts: 2010–2020

- 451 operators have commercially launched 4G-LTE networks across 151 countries worldwide as of the end of December 2015.
- The number of 4G operators is expected to increase by almost 50% by 2020.

Strategies for Rural Coverage

- network sharing
  - passive
  - active
- models drawing on targeted government support
  - subsidies
  - universal service funds (USFs)
- alternatives
  - software-based networks
  - aerial.

Sub-Saharan Africa Mobile Market

- Sub-Saharan Africa has a number of highly competitive markets, with several featuring five or more operators.
- There are also a few outliers, such as Ethiopia, where the incumbent operator still has a monopoly.
- The regional average Herfindahl-Hirschman Index (HHI)is 4,834, the lowest globally, reflecting the intensity of competition, which continues to weigh on prices.

Sub-Saharan Africa Mobile Market

- Low penetration rates suggest significant subscriber growth potential in most markets,
- But the negative impact of low prices on operators' margins and their ability to invest in network expansion has raised the prospect of consolidation in the region.

Market Consolidation in SSA

- Consolidation can help operators move to more sustainable business models and support more efficient investment.
- There have been a few instances of consolidations:
  - Tanzania - Tigo acquired Zantel in 2015
  - Kenya - Safaricom and Airtel jointly acquired Yu's assets in 2014
  - Republic of the Congo - Airtel acquired Warid Telecom in 2014, and;
  - Uganda - Airtel acquired Warid Telecom in 2013.
- Consolidations under consideration to acive more efficient markets include:
  - Côte d'Ivoire and;
  - Democratic Republic of the Congo (DRC)

Sub-Saharan Africa Mobile Market

- The mobile industry in Sub-Saharan Africa continues to scalerapidly, reaching 367 million subscribers in mid-2015.
- Migration to higher speed networks and smartphones continues apace, with mobile broadband connections set to increase from just over 20% of the connection base today to almost 60% by the end of the decade.
- Falling device prices are encouraging the rapid adoption of smartphones, with the region set to add more than 400 million new smartphone connections by 2020, by which time the smartphone installed base will total over half a billion.

Sub-Saharan Africa

- Tower sharing is now a major feature of the mobile
- industry driven by network coverage obligations attached to licences, and costreduction pressures as the decline in revenue growth increasingly affects margins.
- Despite revenue and margin pressures, operators across the region continue to invest heavily to expand network coverage and deploy mobile broadband networks.
- Capital investment in 2014 totalled $9 billion and is set to reach $13.6 billion (24% of total revenues) by 2020.

Sub-Saharan Africa

- The subscriber growth rates are set to slow sharply over the coming years,
- The growth in the second half of this decade set to be around 6% compared to 13% in the first half.
- Just under half of the population will have subscribed to a mobile service by 2020,
- Thus challenges remain in bringing connectivity to unconnected populations across the region.

Mobile Contribution to Economic Development in Sub-Saharan Africa

- The mobile industry remains a key driver of economic growth and employment across the region,
- In 2014, the broader mobile ecosystem generated 5.7% of GDP a contribution of just over $100 billion in economic value.
- Migration to mobile broadband and the growth of new services will see this figure increase to 8.2% of GDP by 2020, reflecting how increased access to mobile services generates regional growth and development.

Contribution to Economic and Social Development

- **Delivering digital inclusion to the still unconnected populations**
  - Mobile internet penetration 23% in 2015, 37% in 2020
- **Delivering financial inclusion to the unbanked populations**
  - 135 live services across the region as of December 2014
- **Delivering innovative new service and apps**
  - Number of M2M connections to reach 30m by 2020

Transition to BWA in SSA

- The region is seeing continued migration to higher speed mobile broadband networks.
- Commercial 3G networks had been launched in 41 countries as of June 2015,
- 4G networks had been launched in 23 countries.

Transition to BWA in SSA

- One-fifth of mobile connections in the region are now based on 3G, up from just 5% in 2010.
- 3G adoption in the region will exceed the global average by 2017,
- Accounting for more than half of total connections by 2020.

Transition to BWA in SSA

- The main factors driving the uptake of 3G are the expansion of network coverage, falling device prices and the launch of the technology in new markets.
- For example, Airtel Africa added 783 3G sites across its 17 markets in the region during the first quarter of 2015.
- In Cameroon, Nexttel launched the country's first commercial 3G network in September 2014, MTN, which launched its 3G network in March 2015, has announced plans to extend coverage to 75% of the population by 2018.

4G Adoption

- 4G is still at a nascent phase in the region, accounting for just under 1% of the connection base, compared to a global average of 11%.
- Factors limiting 4G adoption:
  - network coverage,
  - unavailability of 4G spectrum,
  - underdeveloped device ecosystem and the resultant high costs of ownership of mobile data connections.

4G Early Adopters

- 4G is gaining traction in several markets, particularly Angola, Mauritius, Namibia and South Africa.
- This has been helped by the establishment of enabling regulatory and competitive environments that encourage investment.
- In South Africa, Vodacom's 4G network now covers 40% of the population, providing a solid platform for growth.
- Vodacom launched the region's first commercial voice-over-LTE (VoLTE) service in April 2015, partly to differentiate its service following the launch of LTE Advanced (LTE-A) by Telkom in December 2014.

4G New Adopters

- 4G adoption for the region as a whole will rise to account for 6% of connections by 2020.
- Fifteen new commercial 4G networks were launched in the last year, including for the first time in Ethiopia, Kenya and Rwanda.
- In the technology-leading markets such as Angola, South Africa and Zimbabwe, 4G will account for around one-fifth of total connections by 2020.

Smart Phone Growth

- The growth of 3G connections largely reflects the rising smartphone adoption rate, which has doubled in the last two years to 20% of total connections.
- In comparison, the global average is just over 40%.
- The adoption rate, which is set to accelerate
- further to one-third of connections by 2017 and more than half by the end of the decade, is benefitting from the increasing availability of low-cost devices.

Smartphone Growth

- The average selling price (ASP) of smartphones has fallen significantly in most markets across the region,
- More devices now available in the sub-$100 price range.
- In March 2015, Orange announced plans to launch a sub-$40 smartphone running on the Firefox OS in Africa.
- The low-cost device market is dominated by Asian vendors, such as Gionee, Huawei and ZTE.

AFRALTI

Smartphone Growth

- Other global vendors are also expanding in the region with similar pricing strategies.
- In August 2015, Google extended its Android One program to Sub-Saharan Africa with the launch of the Hot 2 smartphone.
- The device initially sold for $90, but Google is aiming to bring the cost of the handset down to the $50 mark within the next three years.
- Despite the shift in the region towards smartphones and mobile broadband, nearly 450 million connections will still be based on feature phones by 2020.
- Affordability remains a key limiting factor for many consumers in the region, especially poorer rural dwellers who still struggle to afford data-enabled devices and tariffs, despite falling prices.

Rwanda-Case Study

- The Challenges
- The Market Structure
- 4G Rollout Strategy

Rwanda-Challenges (1)

- One of 15 landlocked countries in Africa.
- Lack of a sea border, consequent reliance on expensive air and road freight for the importation of equipment, thus the high cost of network deployment in the country.
- The cost and logistical challenges of network rollout in rural areas, where more than 70% of the population live,
- Lack of grid electricity in remote and sparsely populated villages
- The low spending power of rural consumers further weakens the business case for capital-intensive infrastructure rollout in these communities.

Rwanda-Challenges (2)

- Has achieved near-universal 2G network coverage; around 98% of the population is covered by 2G network services, mainly due to mobile operators' compliance with strict coverage obligations set by the government.
- However, this has cost implications for mobile operators – the defunct operator Rwandatel's inability to meet its coverage obligations was partly responsible for the revocation of its mobile licence in April 2011.
- Imposing similar coverage targets for 4G services could prove challenging, considering the cost and affordability issues, and
- A greater incentive for operators to concentrate their investments on urban areas, which have the potential for quicker returns on their investments.

Rwanda-Market structure

- Rwanda's mobile market had a unique subscriber base of 4.1 million and a penetration rate of 34% at the end of 2014.
- The number of 3G/4G mobile internet subscribers edged above 1 million by the end of 2014, equivalent to 26% of the unique mobile subscriber base.
- Operator Market Share by December 2014:
  - MTN Rwanda -51% as
  - Tigo Rwanda (33%) and
  - Airtel Rwanda (16%).

Rwanda-Strategy and players

- 3G network coverage and subscriber uptake driven by the mobile operators' coverage obligation and market competition.
- The impact - sharp rise in 3G coverage in 2013.
- Exit of Rwandatel in 2011:
  - MTN and Tigo maintained a duopoly
  - Duopoly broken by the arrival of Airtel in 2012.
  - Increase in competition stimulated investments in network upgrade from 2G to 3G by the incumbent operators looking to maintain their competitive edge and
  - New player trying to gain a foothold in the market using 3G.

Rwanda-Strategy and players

- 3G- Market-driven network rollout,
- 4G - the government and South Korea's KT formed a JV In June 2013 - olleh Rwanda networks (oRn),
- to build and manage a nationwide 4G network based on partnership (PPP) model.
- The government allocated 800 MHz and 1800 MHz spectrum to the JV, and mandated it to provide access to ISPs, including the incumbent mobile operators, on a wholesale basis.
- As part of the agreement, KT to invest $140 million in oRn and control the management of the firm with an exclusive licence for 25 years,
- the to government provide financial and administrative support, including the provision of access to its national fibre-optic networks and spectrum.

Impact and Learning

- oRn launched commercial services in November 2014.
- MTN and Airtel utilised the network to launch 4G services to their subscribers in the same month,
- Tigo followed in January 2015.
- oRn also provides 4G access to as many as 10 other ISPs including Broadband Systems Corporation (BSC), New Artel, Axiom Networks, TNSP, and ISPA as distribution partners.
- At launch, the single wholesale network (SWN) comprised 65 cell sites in the capital Kigali, covering around 95% of the city's population.
- Deployment to other parts of the country commence in 2015, and
- the government expects oRn's 4G network to cover 95% of the population by 2018.

Impact and Learning

- The government’s main aim for adopting the SWN strategy is to ensure that the population living in rural areas have access to and can afford mobile broadband services, considering the potentially high cost of separate network rollout by individual service providers.
- However, SWNs risk limiting network-based competition.
- Rwanda is the first country globally to execute a mobile SWN strategy, and
- Although it is too early to assess the performance of the initiative, other countries with similar plans will be closely watching its impact.

HSPA & LTE PLANNING

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