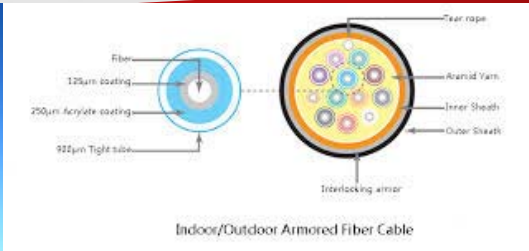


TELECOMMUNICATIONS INFRASTRUCTURE: TRADITIONAL AND EMERGING CHALLENGES

ENGR (DR) CHIDI DIUGWU

DEPUTY DIRECTOR, NEW MEDIA AND INFORMATION SECURITY

NIGERIAN COMMUNICATIONS COMMISSION, NCC



AGENDA

1. THE TRADITIONAL INFRASTRUCTURE
2. THE NEW & EMERGING INFRASTRUCTURE
3. MATURATION ASSESSORS
4. KEY PLAYERS
5. MYTHS AND REALITIES
6. INVESTMENT REQUIREMENT AND CHALLENGES

THE NIGERIAN EMERGING MODEL

8. CHALLENGES
9. CONCLUSION



TRADITIONAL INFRASTRUCTURE



IN THE EARLY DAYS

- Pure data
- Operator terminal to operator terminal
- The Telegraph network
 - A single network
 - Analogue
 - Universal standard
 - All traffic carrier – no alternative



PROGRESSION TO

- Public Switched Telephone Network (PSTN) – Unreliable, poor quality and high error
- Public Switched Data Network (PSDN) – improved on PSTN – built-in error correction, faster (64kbit/s), internal network operating procedure (CCITT X.25 suite of protocols that support packet switched (slow 9.6kbit/s to 38.4kbit/s) then replaced by Open System Interconnectivity OSI)
 - Voice, Text and graphics
 - Operator terminal to computer
- The Telephone network (and the fog set in)
 - The Telex system
 - An extension of telegraph technology
 - Circuit switched
 - Low speed
 - Limited character

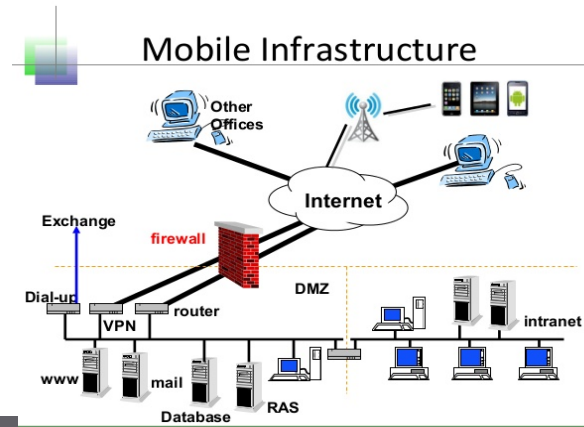
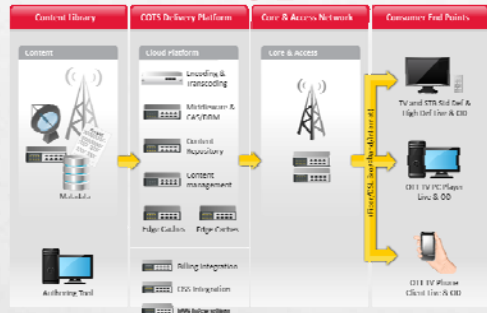


FURTHER PROGRESSION

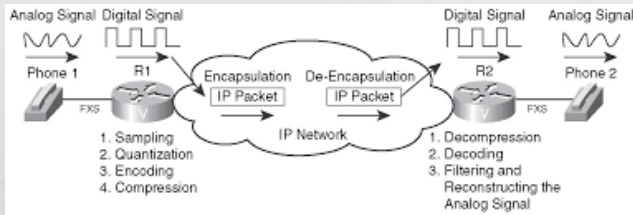
- Local Area Network (LAN) 4Mbit/s to 100Mbit/s (Frame Relay technology up 45Mbit/s for LAN and WAN)
- Switched Multi-Megabit Data Services (SMDA) for MAN up to 34 Mbit/s
- Asynchronous Transfer Mode (ATM) standard for carrying voice, data and video, up to 2 Mbit/s to 2.4Gbit/s, supports ISDN which eventually replaced X.25, Frame Relay and SMDS
 - Anything other than video and then everything
 - Computer to computer
- Modem (satisfied operator terminal to computer appreciably)
 - Data over voice network
 - Faster speed
 - Leased circuit
 - Any terminal equipment



NEW & EMERGING INFRASTRUCTURE



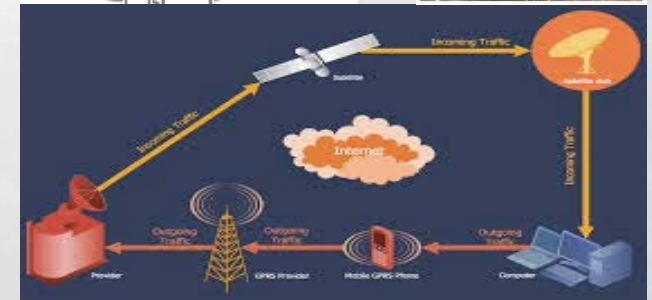
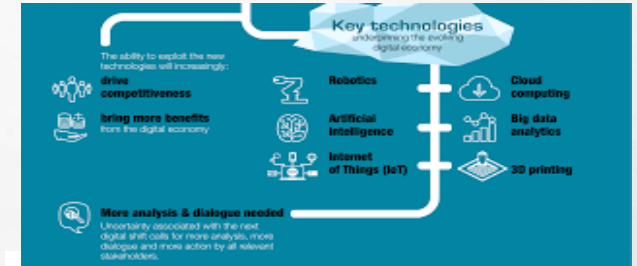
MATURATION ASSESSORS



Traditional Infrastructure



Regulation, Standards and Policies



Emerging Infrastructure



KEY PLAYERS

MYTHS AROUND EMERGING INFRASTRUCTURES (1)

BY THEO BERTRAM (GOOGLE UK) AT THE COMMONWEALTH ICT MINISTERS FORUM, LONDON, JUNE 2018

GOOGLE INVESTS HUGELY IN INFRASTRUCTURE

THERE IS A MYTH THAT TELCOS INVEST IN INFRASTRUCTURE AND OTTs DO NOT. THE MYTH HERE IS THAT SERVICES PROVIDED BY GOOGLE, SUCH AS SEARCH, YOUTUBE OR GMAIL, ARE JUST APPS THAT APPEAR OUT OF THIN AIR ON YOUR PHONE.

- **THE REALITY IS THAT GOOGLE CARRIES DATA 99% OF THE WAY TO OUR USERS. WE HAVE SPENT \$30BN IN JUST THE LAST 3 YEARS ON DATACENTERS AND SUBMARINE CABLES. TO ENSURE FAST AND SECURE SERVICES WE'VE BUILT 90 DATACENTRES, 100 POINTS-OF-PRESENCE (POPS), 3,500 CACHING NODES, AND WE'VE INVESTED IN 11 TRANS-OCEANIC SUBMARINE CABLES SINCE 2010, INCLUDING 3 IN THE CURRENT YEAR. OUR INVESTMENT IN POPS INCLUDES ONE IN LAGOS, WITH GOOGLE INVESTING IN SUBMARINE CABLE CAPACITY TO BRING OUR SERVICES TO NIGERIA; AND WE ALSO HAVE CACHING PLATFORMS WITH MULTIPLE ISPS WITHIN NIGERIA. AS A PROPORTION OF REVENUE, OUR GLOBAL INVESTMENT IN INFRASTRUCTURE STANDS COMPARISON WITH ANY TELECOMMUNICATIONS OPERATOR. SO IT IS FUNDAMENTALLY UNTRUE THAT WE ARE NOT INVESTING IN INFRASTRUCTURE. WE ARE JUST INVESTING IN A DIFFERENT PART OF THE NETWORK TO THE ISPS. THE ISPS ARE RESPONSIBLE FOR THE LAST MILE - THAT IS, AFTER ALL, WHAT THEY GET PAID FOR.**

MYTHS AROUND EMERGING INFRASTRUCTURES (2)

BY THEO BERTRAM (GOOGLE UK) AT THE COMMONWEALTH ICT MINISTERS FORUM, LONDON, JUNE 2018

2. DATA IS DRIVING GROWTH.

THE SECOND MYTH IS THAT OTTS ARE BAD FOR BUSINESS.

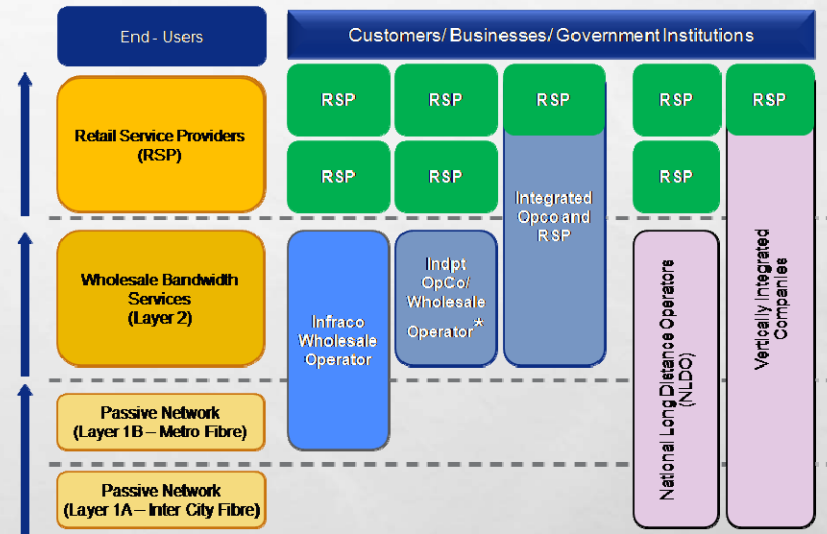
- I WILL CONCEDE THAT WHATSAPP AND SKYPE CREATE COMPETITION FOR SMS AND INTERNATIONAL VOICE CALLING. AS A RESULT, THOSE REVENUES ARE IN DECLINE, ESPECIALLY IN COUNTRIES WHERE COMPETITION HAS FAILED TO TAKE HOLD AND TELCOS HAVE BEEN ABLE TO KEEP PRICES ARTIFICIALLY HIGH. BUT THOSE DAYS ARE OVER. YOU CAN'T EXPECT CONSUMERS TO PAY 40X COST OF 1MB JUST TO SEND 140 CHARACTERS IN ONE SMS. SO THOSE PRICES ARE COMING DOWN. BUT TELECOMS OPERATORS SHOULD NO LONGER BE BUILDING THEIR BUSINESS ON A BUSINESS MODEL FROM 2007.

INFRASTRUCTURE INVESTMENT REQUIREMENTS & CHALLENGES (1)

- **TRADITIONAL (MONOPOLY)**
 - Required to carry out universal service obligation for effectiveness
 - **Mirrors government mood; therefore relies on government subvention and interventions**
- **EMERGING (COMPETITION)**
 - Requires huge funding capacity to enter market and maintain competition
 - Universal access funds to support underserved and unserved communities
 - Public private partnership (PPP)
 - Foreign direct investments (FDI)
 - Listing in Stock Exchange

EMERGING INFRASTRUCTURE – THE NIGERIAN MODEL

- Government is intentionally re-assessing the supportive role appropriate to protect critical infrastructure and also attracting increasing investment. Lowering the barrier to entry into business is encouraging. The ease of doing business index is increasing over time and space
- The rapid changes are being matched by proactive regulatory frameworks and interventions (in Nigeria the regulator, NCC, is facilitating an Open Access Model that is non-discriminatory and price regulated through licensing on Infrastructure companies to cover each of the six political zones and Abuja which is derived from its mandate (Nigerian Communication Act, 2003).
- Through participatory regulatory mechanisms NCC has successfully licensed all seven INFRACOs operators. The commission has a tradition of addressing access and service gaps over the years. Currently, NCC is activity collaborating with the academia and funding telecommunications/ICT researches aimed at addressing emerging infrastructure challenges.



CHALLENGES ASSOCIATED WITH INFRASTRUCTURE

The National Broadband Plan (2013 – 2018 pg. 14) identifies the challenges of broadband operators challenges common to operators in the telecoms sector have been identified as:

- The high costs of right of way resulting in the high cost of leasing transmission infrastructure;
- Multiple taxation at federal, state, and local government levels and having to deal with multiple regulatory bodies;
- Damage to existing fibre infrastructure as a result of cable theft, road works and other operations;
- Lack of reliable, clean grid electricity supply;

OTHER CHALLENGES



- NET NEUTRALITY
- EQUAL OPPORTUNITY FOR PLAYERS
- NEUTRAL TECHNOLOGY
- LAWS: CRITICAL NATIONAL INFRASTRUCTURE (CNI) BILL (SOON TO TAKE EFFECT)
- HUMAN CAPITAL INFRASTRUCTURE DEVELOPMENT (CAPACITY BUILDING)
- CYBER CRIME & SECURITY



CONCLUSION

The maturation of telecommunications infrastructure from traditional to emerging technologies varies with the rapid changes in technology. Each progression redefines the ways services are delivered and used. The challenges of dealing with legacy networks are continuous.

A critical requirement for keeping up to speed is continuous investment on both the physical and human capital infrastructure. The challenges however include security of both the infrastructure and the content (data), enabling laws which protect the assets, achieving net neutrality & technology neutrality, equal opportunity for players, dealing with privacy as well as dealing with cyber crime and security.

Key player e.g. MNOs, ISP, VASP, governments, regulators, academia etc are encouraged to continuously innovate for whatever is existing now is becoming obsolete. The participatory regulatory mechanism being used by the Nigerian Communications Commission, NCC, has attracted international commendation. It enables increasing network coverage and improved quality of service (QoS).

