INTERROGATING MOBILES: A STORY OF NIGERIAN APPROPRIATION OF THE MOBILE PHONE
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A Thesis Submitted to the Graduate Faculty of Rensselaer Polytechnic Institute in Partial Fulfillment of the Requirements for the degree of DOCTOR OF PHILOSOPHY
Major Subject: Science and Technology Studies

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Rensselaer Polytechnic Institute
Troy, New York
August 2009
(For Graduation August 2009)
one’s destination the process is inverted, and the cash is withdrawn from the system.
Finally, being a completely informal practice, it bypasses the monitoring of the formal
economy – a point that may be problematic or preferable depending on one’s point of
view. But whether one views the informality as a negative or positive, the important
feature is that the system arose spontaneously, unlike M-Pesa, WIZZIT and G-Cash. The
spontaneous emergence of a system which required formal operators in many other
nations suggests that there may be something about Nigerian culture itself that is
conducive to appropriation. We have already seen hints of that in the first chapter’s
discussion of appropriation in Nigerian music and drama, and we will return to this
theme later.

The next act of constitutive appropriation that we will examine is one that
involved the configuration of the Nigerian mobile network.

### 3.4 Configuring a “Nigerian” Mobile Network

This is an engineering story, and yet it is not acultural. It is of necessity different because
it takes place in Nigeria. The same story could not be told in France or even in South
Africa. It requires seeing the mobile system from a situated and privileged viewpoint –
that of a “core network” engineer. It is important to qualify the kind of engineer because
there are different types of engineering work involved in making any mobile system
function. The engineers we are concerned with here are responsible for maintaining the
“core network”. They specify, build and optimize all the elements in the switching
subsystem, also known as the “core network”. These elements include the Mobile
Switching Centers (MSC), Base Station Controllers (BSC), the Home and Visitor Location Registers (HLR and VLR) and other specialized network equipment. Below is a diagram of a typical mobile telephone system network topology, showing the elements listed above. The core network elements are encircled.

![Diagram of a typical mobile telephone system network topology, showing the elements in the core network.](image)

**Figure 8 Typical Network Topology Showing elements in the Core Network**

The “core network” is named thus because it is the heart of the mobile telephony network. The elements outside the circle are the Base Transceiver Stations (BTS) and individual mobile terminals – phones (users are not shown on diagram as they are not typically indicated in diagrams of this sort that engineers utilize). Individual mobile phones communicate with the BTS which is best described as the interface between
mobile phones and the network. The BTS is primarily a collection of transmitters and receivers which communicate with individual phones. BTSs have limited local intelligence and are directed and controlled by the BSC. Base Station Controllers (BSCs) monitor and control several BTSs and are in turn monitored and controlled by a Mobile Switching Center (MSC) which is the primary controller and processing hub of the network. If a wireless network can be described as having a heart and or brain, the MSC would fulfill both functions. The other elements in the diagram are ancillary and work as supportive agents to the MSC. The Home Location Register (HLR) is a database system of sorts that stores information about individual subscriber’s identities. The Visitor Location Register (VLR) is a similar system that caters to visitors to the network (for example roaming “guests” from other countries). This simplified diagram leaves out a number of elements because they are not necessary to the telling of the tale.

In order to appreciate the story, it is important to know a little of how a mobile telephony network handles calls. Telephone calls on GSM mobile networks are complicated things. Each call requires a number of operations and generates multiple messages between the phone and the rest of the network. When a mobile user dials a number, the network sends information back and forth in order to setup and make available a voice channel that will carry the conversation between both parties to the call. This setting up process involves database lookups to determine the last known position of the party being dialed in order to get the phone on the other end to ring. All this activity on the network is called signaling traffic differentiated from voice traffic which is traffic that is billable and thus earns money for the mobile operator. Signaling traffic is a continuous phenomenon, occurring in the background, because as long as a
mobile phone is switched on, it is required to constantly update the network on its
gеographical location and status. However, signaling traffic intensifies when a call is in
the process of being placed.

In conversations with radio and network engineers at MTN, I learnt that when it
came to configuring the mobile network in Nigeria, the traditional rules that were
invoked as standard and conventional failed miserably. Following generally accepted
rules and practices, MTN designed and configured their network to handle the specified
number of users that they had taking into account, geography of the coverage area,
frequency selection, the size of each cell, and other important variables. However, the
network that resulted from the outcome of this design quickly ran into problems as
crucial sections of the core network quickly became saturated and acted as bottlenecks to
the flow of traffic, bringing the network quickly to its knees. These problems elicited
complaints from users all over the country and in response, the Nigerian Communication
Commission (NCC) put pressure on MTN. In response MTN stopped accepting new
subscribers while they tried to figure out the root cause of the problems.

As I reconstructed their efforts over the course of multiple interviews, a picture
of what they were up against emerged. It turns out that mobile users in Nigeria behave
very differently from mobile users elsewhere, and it was this behavior that made all the
old rules of dimensioning (an engineering term that refers to the process of generating
specifications based on particular constraints) the network irrelevant. As the engineers
responsible for dimensioning the BSCs in the network quickly discovered, though the
manufacturer specified particular BSCs as capable of managing a certain number of
BTSs, if one did indeed load the recommended number of BTSs on the BSCs, the result
was a non-functional network. The solution was *over-dimensioning* (going beyond the standard recommended values) the network. This was achieved by using more BSCs, and fewer BTSs per BSC, increasing the number of MSCs and upgrading the data-link communication channels between core network elements (represented in the diagram by solid lines, the radio connections are represented by dotted lines). It was only after these substantial and expensive changes that the network was sufficiently robust and capable of handling the traffic that Nigerian users generated. In the words of the Chief Technology Officer (CTO), the pre-eminent engineer in the company…

“What is really strange in Nigeria is that we have a very high busy hour call attempt…Whereas in a country like South Africa and a lot of other developed nations you see between 1 and 1.5 busy hour call attempts, the average here is about 3.6 or 3.9”

Another statement that he made,

“In Nigeria what you find is that subscribers have quite short Mean Hold Times. 19 seconds for outgoing calls and 32 seconds for incoming calls.”

I quickly learnt that these two indices - Mean Holding Time (MHT) and Busy Hour Call Attempts (BHCA) are ways of describing mobile phone user behavior. They also have a tremendous impact (at least in Nigeria) on the way the networks are designed. The index on the MTN network was woefully small and measured in seconds, whereas European indices are usually measured in minutes. MHT reflects the average amount of time users spend on a call. Nigerian MTN users stay on the phone for an average of roughly 19 seconds per call. In essence, they spend a very short time on the phone speaking if they initiate the call, and roughly one and a half times as long if they receive the call. This
discrepancy between time spent when receiving a call and time spent when making a call may be explained in some measure by the fact that the policy of mobile phone billing in Nigeria is the same as in Europe – calling party pays - the effect of this is that the party placing the call shoulders the entire cost and the party on the receiving end pays nothing. Contrast this with US mobile phone billing policy where both parties pay irrespective of who places or receives calls.

Busy Hour Call Attempts (BHCA) is a teletraffic measure that represents the number of calls attempted at the busiest hour of the day by all users. In experiential terms, a BHCA of 3.9 means that Nigerian subscribers at the busiest hour of the day, when confronted with a busy signal, will retry four more times before giving up.44 “Developed Nation” (in the words of the MTN CTO) users on the other hand, upon receiving a busy signal, would usually try just one more time and then give up. Interpreting both indices a picture emerges of the “average user” during peak periods.45 The average Nigerian mobile phone user only stays on the phone for nineteen seconds

44 Nigerian mobile users may be so persistent because they experience busy signals frequently. These busy tones are usually arise as a result of network congestion. In that case, retrying the number can sometimes work. Unfortunately, this leads to a self-reinforcing positive feedback cycle where once someone tries a number unsuccessfully, recieves a busy signal and tries again, the person generates congestion for other network users and they responding by copying the same behavior and the cycle self perpetuates. Going solely on personal experience, in the US busy signals are so rare that they are usually indicative of something consequential to one’s ability to place the call like the other party being engaged on another line. In other words, one could say that Nigerian mobile users interpret busy signals as, not available right now try again (right away), while US mobile users interpret busy signals as, not available, try later. Perhaps when busy signals fall below a certain threshold, Nigerian mobile users will lower their BHCA.

45 Of course, said “average user” is a fiction generated by these numbers. In reality, Nigerian citizens vary widely in their use of mobile technology, with some users spending much longer on calls, and other spending shorter amounts of time on calls. For more on the construction of both users and non-users, see Sally Wyatt (2003)
once connected. If the line is busy, said user tries immediately to make another call and
if unsuccessful, keeps on trying at least four more times. As has been mentioned
previously, each time a call is initiated, the network needs to locate the mobile phone of
the receiving party (which it does by querying its databases), and then actively select and
devote voice channel resources to the call. All this requires substantial processing by the
MSC and utilizes valuable bandwidth as messages travel back and forth amongst the
various network elements in their effort to accomplish this process, which in engineering
speak is referred to as “call set-up”. These processes utilize the processing capacities of
the MSC, HLRs and VLRs, *even if the call does not go through* (i.e. is unsuccessful for
whatever reason). Taking into account the high BHCA and the low MHT, it is easy to
see how the network can quickly become saturated, as subscribers who are unable to get
through, have precious limited resources allocated to them. Then, they keep on trying,
tying up further network resources, only to get through and spend a short time on the
phone before making another call.

The result of following the traditional dimensioning methodology, was that
though the network could *theoretically* (here the basis of the theory was the behavior of
a well known quantity, the average European user) handle all the traffic, the processing
capacity limit was quickly being reached and very few calls (if any) where being
successfully routed. MTN had to go back to the drawing board and redesign the network
( based on the real Nigerian user). This resulted in the network being *over-dimensioned
with respect to the old standard* and more MSCs and larger BSCs (utilizing High Speed
Links between them) became necessary. In engineering vernacular, the *traffic profile of
Nigerian users requires a fundamentally different kind of network.*
MTN is a large transnational corporation with substantial buying power, and because it operates in a relatively small market (there are not that many mobile operators in the world), it has much greater input into the design cycle of the businesses from which it purchases its equipment. It was therefore inevitable, that the challenges of building GSM networks in places like Nigeria were brought to the attention of MTN’s suppliers – in this case the Swedish global telecommunication giant Ericsson. Observations about the “strange behavior” of Nigerian users were communicated to Ericsson by MTN. Ericsson and other core network equipment manufacturers have developed new designs for these devices (based on blade server architecture) that allow their end users (the mobile operators) to upgrade specific portions of the hardware.46

As an example of constitutive appropriation that we can label “Adaptation”,47 this example highlights the importance of paying attention to the dualism of production and consumption. It is true that the MTN engineers were in many respects the designers of the mobile network, however, it is also true that the Ericsson representatives I spoke with in distant London, saw and spoke of them as their users. The MTN network

46 I tried in vain to establish direct causal links between the concerns of organizations like MTN about the need to “over-dimension” their networks, and the new initiatives by Ericsson to introduce new product architecture that allows for specific upgrades where required. I visited Ericsson offices in London and Lagos, and in the course of conversations with various engineers and project managers, I was able to establish that the design cycle directly utilized user (here the users are the mobile operators) feedback, but there were other considerations that led to these substantial changes, including advances in computer hardware technology. In other words they were hesitant to fully attribute their new design decisions to the kinds of user feedback described here. They did however concede that “emerging markets” like those in Africa were crucial to their ongoing success and as such their needs were influential in the decision making process.

47 This is a case of adaptation (in Eglash’s parlance), as the solution to the unprecedented traffic profile of Nigerian users was to utilize latent functionality in the network devices leading to the creation of a new unprecedented network.
engineers when faced with unprecedented mobile-user behavior (in the form of unique traffic profiles, short mean call times and a high BHCA) adapted by deploying core network elements in new configurations ignoring standard rules of network design. Even more interestingly, by problematizing the different aspects of MSC design (i.e. processing capacity versus switching capacity), they catalyzed new designs that called for scalable processing power of MSCs – affecting the design of future individual mobile-network components (MSCs and BSCs). Here again, by avoiding an explicit focus on marginality, constitutive appropriation allows the analysis to include engineers.

The third case of constitutive appropriation we will turn to is one that is less about use practices and more about cultural interpretation.

### 3.5 Flashing / Beeping

The final case is about a practice that is termed “flashing” in Nigeria. Elsewhere in the world it has been referred to as “beeping”. To flash, a user calls another user and then drops the phone after the other party’s phone has recorded the “flash” by ringing at least once, sometimes longer. Flashing is a simple communication act that utilizes the mobile network to reach out and virtually “touch” another albeit by means of a fairly narrow band communication. Though deceptively simple, it works because it takes advantage of a number of structural elements present in the design of mobile telephony systems. First, flashing uses the ability of mobile networks to locate other phones and ring them. Also,

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48 Donner (2008) explores the widespread nature of this practice. He identifies similar practices in Finland, Ghana, Sri Lanka, India, Indonesia and Jamaica.