

BOOK CHAPTER | “Hello ! Who’s Calling”

## Mobile/Telephone Contacts and Calls In Forensics Analysis

**Samuel Opoku Daniels**

Digital Forensics & Cyber Security Graduate Programme

Department Of Information Systems & Innovations

Ghana Institute of Management & Public Administration

Greenhill, Accra, Ghana

**E-mail:** samuel@fucuh.com

**Phone:** +233244139937

### ABSTRACT

When tackling and preventing crime, the analysis of mobile or tele phone data, particularly contacts and calls among crime actors plays a significant role in both civil and criminal cases. Forensic analyst and investigators are able to reconstruct illegal and suspicious activities between specific individuals on the basis of the relationships connecting those individuals. This paper discusses mobile / tele phone contacts and calls in forensic analysis. By analysing the contacts and call log data among individuals related to a criminal activity, forensic analysts and investigators get a proper perspective about a particular criminal network. It is worth mentioning that not all mobile phones are smartphones. But they all have the same ability to store the names and phone numbers as well as call logs. When dealing with a digital device such as a mobile phone, the method used to extract data from it must have little impact on the memory for the evidence to be admissible in court. As such, the methods used to acquire data from a mobile phone will play an important part in an investigation which requires evidence to be extracted from a mobile phone. The investigator must be sure that the information acquired actually reflects that which is stored in the phone, and that the procedures used do not adversely affect the integrity of the information, or any other data stored in the device (McCarthy, 2005). Mobile or tele phone contacts and call data is important to law enforcement in tracking illegal activities and providing evidence for dismissals or acquittals.

**Keywords:** Mobile, Telephone, Calls, Threats, Forensic Analysis, Cyber Security,

---

BOOK Chapter | Research Nexus in IT, Law, Cyber Security & Forensics. Open Access. Distributed Free

**Citation:** Samuel Opoku Daniels (2022): Mobile/Telephone Contacts and Calls In Forensics Analysis  
Book Chapter Series on Research Nexus in IT, Law, Cyber Security & Forensics. Pp 315-320  
[www.isteams.net/ITlawbookchapter2022](http://www.isteams.net/ITlawbookchapter2022). dx.doi.org/10.22624/AIMS/CRP-BK3-P50

---

### 1. INTRODUCTION

From crucial compelling evidence in the Kumasi kidnappers’ trial (Modern Ghana, 2022) to inculpatory call records in Alejandro Avila’s alleged murder, kidnapping and rape case, mobile/telephone calls have proven to be priceless resources for forensics analysts.

Criminal investigators and defense lawyers have also leveraged on same. Mobile phones are ubiquitous in the world today, they have become an integral part of our daily lives. By dint of their portability and their rate of use, mobile phones hold information about user activities, contacts and locations. This can be a treasure trove of evidence in criminal investigations. Typically, data that can be retrieved from a mobile or telephone devices include contacts, call logs, short message service (SMS) and sometimes deleted items, etc. In this paper, my concentration is on call logs and mobile/telephone contacts.

Edmond Locard rightly observes that in the physical world, when perpetrators enter or leave a crime scene, they take something with them and leave something behind (United States Naval Academy, 2022). Mobile or telephone contacts and calls are equivalent to fiber and hair that the perpetrators usually leave behind. Mobile / tele phone devices have become integral part of our daily lives. Almost every traditional crime committed, there is always a digital trail or footprint left behind by the criminals.

The Australian Institute of Criminology found that mobile phones are the most common form of communication for people purchasing heroin, methamphetamines and cocaine (Milner & Mouzos, 2004). It is also true that some of the criminals make a deliberate and conscious effort to destroy the evidence or create a diversion so that investigators and forensic analysts may look elsewhere.

Some of the modern mobile and tele phone devices can be configured to auto-delete call history. Some of the devices only store the last few call logs on the phone and auto-delete the old call history. In such a case, it becomes extremely difficult for forensic analysts and investigators to reconstruct a proper call pattern and the appropriate connections between a criminal activity and the perpetrators involved.

The many different types of hardware and software, coupled with the huge number of mobile operating systems and Security features post a great challenge to mobile / tele phone forensics in general (Jones & Winster, 2017). There are different ways of acquiring information from a mobile phone.

Arguably, the most convenient is to use a software running on a desktop computer to send a query commands to the phone to retrieve information stored in the phone's memory. The most effective and forensically sound way would have been creating a digital image of the memory and creating a hash of that copy before it is analysed. This approach even though the best is not always possible with mobile phones. There are times that the forensic examiner needs to physically assess the phone for retrieving evidence.

## **2. RELATED LITERATURE**

There has been some work on mobile / tele phone contacts and calls forensic analysis that extends the use of the address book on phones. This is reminiscent of the digital traces users of smartphones leave behind considering the volume of call transactions they carry out on a daily basis (Akhigbe, et al., 2017). Various research streams focus on the relevance of mobile or tele phone calls and contacts in forensic analysis and crime investigations.

**Table 1: related Works Outlook**

<b>Title Of Paper</b>	<b>Author(S)</b>	<b>Findings</b>
Uncovering individual and collective human dynamics from mobile phone records	(Julian et al., 2017)	Fixing the time of observation between consecutive calls it is possible to use the phone call data to characterize some aspects of human mobility
A Visual Tool for Forensic Analysis of Mobile Phone Traffic	(Salvatore & Giacomo, 2014)	LogAnalysis, a tool for forensic visual statistical analysis of mobile phone traffic. Figure 1 below shows how LogAnalysis works
Cell Phone Forensic Tools: An Overview and Analysis Update	(Rick et al., 2007)	Overview on current tools designed for acquisition, examination, and reporting of data discovered on cellular handheld devices, and an understanding of their capabilities and limitations
Detecting criminal organizations in mobile phone networks	(Emilio et., 2014)	A theoretical framework for the problem of detecting and characterising criminal organisations in networks reconstructed from phone call records
Memory forensics: The Path forward	(Case & Richard III, 2016)	Analysed memory forensics of volatile memory and also described the changes that happens in Operating System Design
Anti-forensics: Furthering digital forensics science through a new extended, granular taxonomy	(Kevin et.al., 2016)	Created a data set which would be helpful for digital forensics by collection and organisation of 308 anti-forensics tools and also created an anti-forensics taxonomy for the purpose of encapsulating within the domain of anti-forensics.

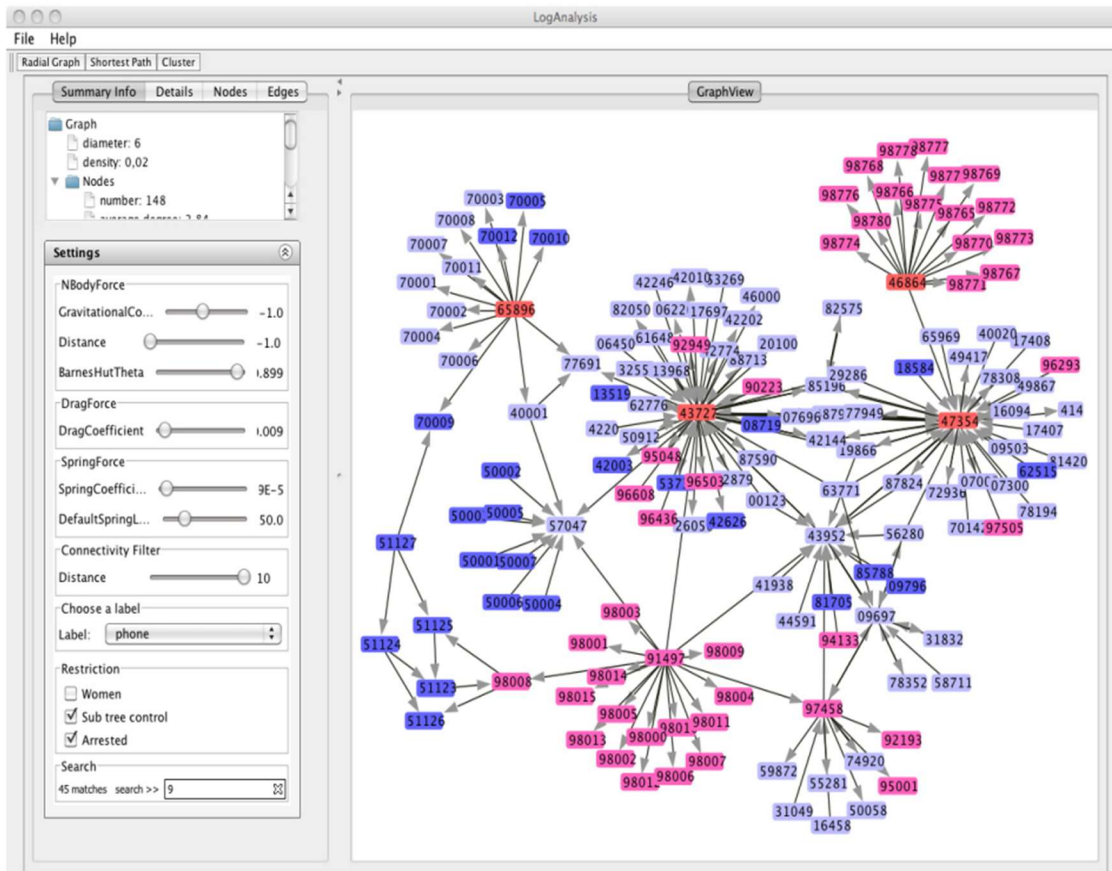


Figure 1: LogAnalysis (Salvatore & Fiumara, 1024)

### 3. IMPLICATIONS FOR CYBER SAFETY IN AFRICA

Arguably, Africa has been among the fastest growing regions as far as cybercrime activities are concern. The continent has contributed significantly as a source of cyberattacks targeting other continents of the world. As a result, many countries in Africa have been blacklisted from using some international online payment systems such as PayPal. Measures are being taken by many African countries to curtail the cybercrime menace that has plagued Africa. The continent will be able to leverage internet and other technologies to increase trading activities which will consequently help to improve its economy. Cyber safety in Africa implies that many Africans will have confidence in their system and engage in useful trading activities which in turn will help boost the African economy significantly.

#### **4. RESEARCH GAPS/FINDINGS**

There are two standard extraction methods for mobile / tele phone forensics analysis. They are logical and physical. One notable challenge in retrieving call logs and mobile or tele phone contacts is that most of the tools required, use commands and protocols that indirectly access the memory, particularly, they rely on the operating system, which means that the phone must be operational and only data that is visible to the operating system can be recovered (Fang, J. et al., 2012).

This problem stems from the fact that unlike computers where the manufacturers adhere to specific standards, say in the manufacturing of Hard Disk Drives (HDDs) or Solid-State Drives (SDDs), there are so many protocols the manufacturers of mobile phone use. As a result, the protocols used for phone to personal computer (PC) communication are unpublished, and not standardized. There is little or no research in the development of a communication protocol for complete memory access and analysis. Standard protocol for retrieving and analysing data in a forensically sound manner on mobile and tele phones should be created.

#### **5. CONCLUSION**

Mobile / Tele phones are ubiquitous. They have become integral part of our daily lives. They are the main communication medium for most crimes. Phone calls and contacts are analogous to hair and blood stains perpetrators often leave behind after every crime. When forensic analysts and investigators are able to retrieve phone calls and contacts from the mobile devices of suspects, they may be able to reconstruct illegal and suspicious activities between specific individuals on the basis of the relationships connecting those individuals. The problem however, stems from the fact that, there is no standardized approach to retrieve data in a forensically sound manner, due to the fact that there are so many kinds of software and hardware of phones.

#### **6. RECOMMENDATION FOR POLICY AND PRACTICES**

Mobile / Tele phone manufactures must develop their components using the same standards. Like computers, it will be easy to integrate the components of one brand into another. As a result, retrieving data from the devices will be easy since they all have the same standards. Also, phone-to-pc communication will be forensically sound since all the manufacturers adhere to the same standards.

#### **7. DIRECTION FOR FUTURE WORKS**

Future research in this area may focus on creating a standadised approach of forensically retrieving data from mobile / tele phones. Future research may also focus on applying reverse engineering techniques to obtain a detailed understanding of the allocation architecture for phone calls, phonebook entries.

## REFERENCES

1. Paul McCarthy. "Forensic Analysis of Mobile Phones". University of South Australia (2005).
2. Modern Ghana, "Phone records of Kumasi kidnappers land in Court". Accessed on 14<sup>th</sup> May, 2022, <https://www.modernghana.com/news/1067615/phone-records-of-kumasi-kidnappers-land-in-court.html>.
3. United States Naval Academy, "Computer Forensics". Accessed on 14<sup>th</sup> May, 2022, <https://www.usna.edu/Users/cs/wcbrown/courses/si110AY13S/lec/I30/lec.html>.
4. Makkai T, Milner L & Mouzos J 2004 '2003 Annual Report on Drug Use Among Police Detainees', Australian Institute of Criminology, no. 58, Canberra.
5. G. Maria Jones and S. Godfrey Winster. "Forensics Analysis On Smart Phones Using Mobile Forensics Tools". International Journal of Computational Intelligence Research (2017) 1859-1869.
6. Akhigbe, et al., "An Architecture-Based Technique To Mobile Contact Recommendation For Emergency Situation In Nigeria", Nigerian Journal of Technology (January, 2017) 186 - 195.
7. Julian Candia et al, "Uncovering individual and collective human dynamics from mobile phone records", 2017.
8. Salvatore A. Catanese and Giacomo Fiumara, "A Visual Tool for Forensic Analysis of Mobile Phone Traffic", 2014.
9. Rick Ayers et al, "Cell Phone Forensic Tools: An Overview and Analysis Update", NIST, Computer Security Division. 2007.
10. Emilio et al, "Detecting criminal organizations in mobile phone networks", 2014.
11. Andrew Case, Golden G. Richard III, "Memory forensics: The Path forward", Digital investigation (2016) 1-11
12. Kevin Conlan, Ibrahi, Baggili, Frank Breiting, "Anti-forensics: Furthering digital forensics science through a new extended, granular taxonomy" Digital investigation 18 (2016) S66-S75
13. Fang, J. et al. (2012). Forensic Analysis of Pirated Chinese Shanzhai Mobile Phones. In: Peterson, G., Shenoi, S. (eds) Advances in Digital Forensics VIII. DigitalForensics 2012. IFIP Advances in Information and Communication Technology, vol 383. Springer, Berlin, Heidelberg. [https://doi.org/10.1007/978-3-642-33962-2\\_9](https://doi.org/10.1007/978-3-642-33962-2_9)