Journal of Information Systems and Communication
ISSN: 0976-8742 & E-ISSN: 0976-8750, Volume 3, Issue 1, 2012, pp.-243-246.
Available online at http://www.bioinfo.in/contents.php?id=45

ANALYSIS OF INTERNATIONAL NUMBERS OF A CELL PHONE

SHAMIKH FARAZ

Department of Computer Science, Shafi Degree College, Bisalpur, UP, India.
*Corresponding Author: Email- shamikh.faraz@hotmail.com

Received: January 12, 2012; Accepted: February 15, 2012

Abstract- This paper focuses on the use of international numbers of a cell phone such as IMEI number, IMSI number and the SIM card number printed on the SIM card through which one can find the hidden information about its cell phone regarding manufacturer, date of manufacturing, model type, country of approval etc. The information is also useful in danger situation such as when the cell phone has been lost or stolen. This paper defines how to make disable the cell phone using these numbers. So that nobody can make the use of cell phone for any bad activity. This also explains how to find these international numbers in the cell phone, what are their hidden codes and structures. After finding, when, where, how to use these numbers for protecting the cell phone and SIM card.
Keywords- IMEI number, IMSI number, SIM card number, phone numbers, International numbering plans.

Citation: Shamikh Faraz (2012) Analysis of International Numbers of a Cell Phone. Journal of Information Systems and Communication ISSN: 0976-8742 & E-ISSN: 0976-8750, Volume 3, Issue 1, pp.-243-246.

Introduction

International Mobile Equipment Identity (IMEI)

The IMEI (International Mobile Equipment Identity) is a unique 15 digit code used to identify an individual mobile station to a GSM or UMTS network. The IMEI number provides an important function, it uniquely identifies a specific mobile phone being used on a mobile network. The IMEI is a useful tool to prevent a stolen handset from accessing a network and being used to place calls. Mobile phone owners who have their phones stolen or lost can contact their mobile network provider and ask them disable a phone using its IMEI number. With an IMEI number, the phone can be blocked from the network quickly and easily. It is important to note that swapping a SIM card will not stop a phone from being banned. IMEI numbers are stored in the phones themselves, not on the SIM cards.

An IMEI is only used to identify the device and does not relate to a specific individual or organization. Other numbers such as the ESN (Electronic Serial Numbers) and MEID (Mobile Equipment Identifiers) can link an individual to a phone. Usually, an IMSI (International Mobile Subscriber Identity) number stored on a SIM card can identify the subscriber on a network.

International Mobile Subscriber Identity (IMSI)

The IMSI is a globally-unique code number that identifies a GSM subscriber to the network. The IMSI is linked to your account information with the carrier. The IMSI resides in the SIM card, which can be moved from one GSM phone to another.

The IMSI is used in any mobile network that interconnects with other networks. This number is provisioned in the phone directly or in the R-UIM card (a CDMA analogue equivalent to a SIM card in GSM). All mobile phone subscribers are assigned a unique 15-digit IMSI number

to allow foreign mobile networks to identify subscribers from abroad. One of the major challenges of the system is that it is not properly set up to translate the digits in countries in which there are multiple country codes, such as the United States. In an effort to minimize this problem, the system uses area codes within the country. The 4G network is set to eliminate ambiguities with the country code problem within IMSI.

Subscriber Identification Module (SIM)

GSM mobile phones require a small microchip called a Subscriber Identification Module or SIM card, to function. The SIM card is approximately the size of a small postage stamp and is usually placed underneath the battery in the rear of the unit. The SIM securely stores the service-subscriber key (IMSI) used to identify a subscriber on mobile telephony devices (such as mobile phones and computers). The SIM card allows users to change phones by simply removing the SIM card from one mobile phone and inserting it into another mobile phone or broadband telephony device. SIM cards are used with carriers that operate on the Global System for Mobile Communication (GSM) network. The competing network is Code Division Multiple Access (CDMA), a technology created by U.S. company 'Qualcomm'.

SIM card contains its unique serial number, security authentication, ciphering information and temporary information related to the local network, a list of the services the user has access to and two passwords (PIN for usual use and PUK for unlocking).

Analysis of an IMSI Number

There are several ways in which you can locate your mobile phone's IMEI number. The IMEI can usually be found on the handset, beneath the battery, sometimes printed on a small white label. Another way to easily locate your IMEI phone is to dial the following sequence of numbers into the handset: *#06#.

Structure of an IMEI number

- IMEI number comes in a 15 digit sequences of numbers. The IMEI format currently utilized is AA-BBBBBB-CCCCCC-D.
- AA: These two digits are for the Reporting Body Identifier, indicating the GSMA approved group that allocated the TAC (Type Allocation Code).
- BBBBBB: The remainder of the TAC
- CCCCCC: Serial sequence of the Model
- D: Luhn check digit of the entire model or 0 (This is an algorithm that validates the ID number)

How to locate an IMEI number on cell phones

- Ensure your phone is powered on.
- Return to the "idle" screen, or your "desktop".
- If you were in the middle of a call, end it, and clear any numbers you pressed while making that call.
- Press the following keys one by one: * # 0 6 #
- As you press on the last #, a number will appear with the title, IMEI number, or similar.
- And if you store this *#06# as a phone number in your contacts with the some name, say, IMEI Code, then next time when you dial IMEI Code from your contacts, it will show you the IMEI Number. That way you won't forget the *#06# sequence.

OR

- Ensure the phone is powered off.
- Remove the battery.
- Look on the phone for a white sticker/label, which would be now exposed after removing the battery, for the IMEI. It would be 15 or 17 digits not including a few forward slashes included and without any letters. Only the first 15-digits are needed.
- If the phone is not available or if the label is unreadable then have a look at the phone manufacturer's packaging for a white sticker/label. Near one bar code or another the IMEI would also be printed

How to find IMEI number in different handsets

- FOR NOKIA press *#06# on mobile screen
- FOR SONY ERICSON *,left, left,*,left,*,left
- In iPhone use about icon or connect to iTUNES to identify unique number.
- Use sequence #* menu right arrow for metrola model.

Registration Process of an IMEI number

- For china mobile first dial *#06# and find IMEI number.
- send SMS to 57886 as follow: IMEI <your IMEI Number>
- You will get the status your IMEI number and mobile.
- For other mobile phones go on manufacturer's website and register it.

Analysis of an IMSI Number

The process of examining the IMSI number is known as IMSI analysis. This determines whether a particular subscriber has access to the network in which it is located or is forced to move into a roaming pattern.

An IMSI is usually presented as a 15 digit long number, but can be shorter. For example MTN South Africa's old IMSIs that are still being used in the market are shown as 14 digits. The first 3 digits are the Mobile Country Code (MCC), and is followed by the Mobile Network Code (MNC), either 2 digits (European standard) or 3 digits (North American standard). The length of the MNC depends on the value of the MCC. The remaining digits are the Mobile Subscription Identification Number (MSIN) within the network's customer base.

If the subscriber is not from the provider's network, the IMSI must be converted to a Global Title, which can then be used for accessing the subscriber's data in the remote HLR. This is mainly important for international mobile roaming. Outside North America the IMSI is converted to the Mobile Global Title (MGT) format, standard E.214, which is similar to but different from E.164 number (more or less a telephone number). E.214 provides a method to convert the IMSI into a number that can be used for routing to international SS7 switches. E.214 can be interpreted as implying that there are two separate stages of conversion; first determine the MCC and convert to E.164 country calling code then determine MNC and convert to national network code for the carrier's network. But this process is not used in practice and the GSM numbering authority has clearly stated that a one stage process is used

Structure of an IMSI number

The International Mobile Subscriber Identity is a unique identifier allocated to each mobile subscriber in a GSM and UMTS network. It consists of a MCC (Mobile Country Code), a MNC (Mobile Network Code) and a MSIN (Mobile Station Identification

Number).
It is no where stored in your Mobile phone like your PIN and PUK Code so you can't watch it but you can ask with your operator.
It is basically 15 digit key
0-3 = MCC (Mobile Country Code)
0-2 or 3 = MNC (Mobile Network Code)
rest is MSIN

Examples of IMSI numeric presentation

IMSI: 310150123456789		
MCC	310	USA
MNC	150	AT&T Mobility
MSIN	123456789	

IMSI:404685505601234		
MCC	404	India
MNC	68	MTNL Delhi
MSIN	5505601234	

Analysis of a Subscriber Identification Module (SIM)
This is also called SUBSCRIBER IDENTITY MODULE (SIM). The first SIM card was made in 1991 by Munich smart card maker Giesecke & Devrient for the Finnish wireless network operator Radiolinja. Giesecke & Devrient sold the first 300 SIM cards to Elisa.
A SIM is held on a removable SIM card, which can be transferred between different mobile devices. SIM cards were first made the same size as a credit card (85.60 mm × 53.98 mm × 0.76 mm). The development of physically smaller mobile devices prompted the development of a smaller SIM card, the mini-SIM card. Mini-SIM cards have the same thickness as full-size cards, but their length and width are reduced to 25 mm × 15 mm. The newest incarnation known as the 3FF or micro-SIM has dimensions of 15 mm × 12 mm. Most cards of the two smaller sizes are supplied as a full-sized card with the smaller card held in place by a few plastic links; it can easily be broken off to be used in a device that uses the smaller SIM.

Table 1- Type Sizes For Sim Cards

SIM card sizes				
SIM card	Standard reference	Length (mm)	Width (mm)	Thickness (mm)
Full-size	ISO/IEC 7810:2003, ID-1	85.6	53.98	0.76
Mini-SIM	ISO/IEC 7810:2003, ID-000	25	15	0.76
Micro-SIM	ETSI TS 102 221 V9.0.0, Mini-UICC	15	12	0.76

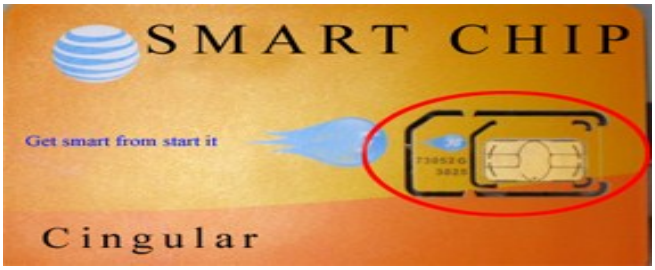

Fig. 1- Old SIM card as a credit card sized with a smaller SIM chip in it

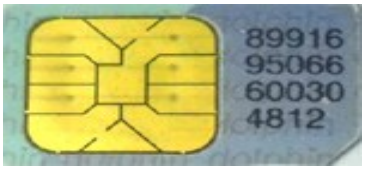

Fig. 2- Mini SIM card

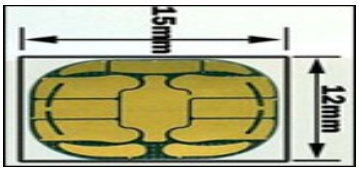

Fig. 3- Micro SIM card

Fig. 4- size comparison of Mini and micro SIM card

Data stored in the SIM card
SIM cards store network-specific information used to authenticate and identify subscribers on the network. The most important of these are the ICCID, IMSI, Authentication Key (Ki), Local Area Identity (LAI) and Operator-Specific Emergency Number. The SIM also stores other carrier-specific data such as the SMSC (Short Message Service Center) number, Service Provider Name (SPN), Service Dialing Numbers (SDN), Advice-Of-Charge parameters and Value Added Service (VAS) applications

Authentication key (Ki)
The authentication key or Ki is a 128 bit key used in the authentication and cipher key generation process. In a nutshell, the key is used to authenticate the SIM on the GSM network. Each SIM contains this key which is assigned to it by the operator during the personalization process. The SIM card is specially designed so the Ki can't be compromised using a smart-card interface. However, flaws in the GSM cryptography have been discovered that do allow the extraction of the Ki from the SIM card, and essentially SIM card duplication.

ICCID (internationally identified by its integrated circuit card identifier)
Each SIM is internationally identified by its integrated circuit card identifier (ICCID). ICCIDs are stored in the SIM cards and are also printed on the SIM card body during a process called personalization.

- A typical SIM (19 digits) example 89 91 10 1200 00 320451 0, provide several details as follows:
- The first two digits (89 in the example) refer to the Telecom Id.

- The next two digits (91 in the example) refer to the country code (91-India).
- The next two digits (10 in the example) refer to the network code.
- The next four digits (1200 in the example) refer to the month and year of manufacturing.
- The next two digits (00 in the example) refer to the switch configuration code.
- The next six digits (320451 in the example) refer to the SIM number.
- The last digit which is separated from the rest is called the "check digit".

Issuer identification number (IIN)
Maximum of seven digits:
Major industry identifier (MII), 2 fixed digits.89 for telecom purpose.
Country code, 1-3 digits.
Issuer identifier, 1-4 digits.

Location Area Identity (LAI)
Each location area of a public land mobile network (PLMN) has its own unique identifier which is known as Location Area Identity (LAI). This internationally unique identifier is used for location updating of mobile subscribers. It is composed of a three decimal digit Mobile Country Code (MCC), a two to three digit Mobile Network Code (MNC) that identifies the GSM PLMN in that country, and a Location Area Code (LAC) which is a 16 bit number.

SIM Security
Information inside the UICC can be protected with a PIN and a PUK.
A PIN locks the SIM card until correct code is entered. Each phone network sets the PIN of SIM to a standard default number (this can be changed via handset). If PIN protection is enabled, the PIN will need to be entered each time phone is switched on. If the PIN is entered incorrectly 3 times in a row, the SIM card will be blocked requiring a PUK from the network/service provider.
A PUK is needed if the PIN is entered incorrectly 3 times and the SIM is blocked (phone is unable to make and receive calls/texts). The PUK can be received from the network provider, or possibly the GSM cell phone manual.
Caution
if PUK is entered 10 times incorrectly, the SIM card is permanently disabled and must be exchanged
Getting geographic location using phone numbers
If you are getting missed calls from unknown numbers, then with the help of some websites you can find the information related to that phone number such as location of the number, type of SIM card & technology, telecom operator, the region and country of approval etc. Some sites are available only for Indian mobile numbers and some are for international mobile numbers.
http://bhartiyamobile.com
This website provides information about Indian mobile numbers only. So there is no need to add country code like +91 for India before the phone number. This can give information about 1.19 billion (119 carore) Indian mobile numbers. After tracing, this gives information regarding location of number and telecom company.
http://tp2location.com
This is for international phone number tracing i.e. mobile numbers from outside India. So there is a need to add country code before mobile number just like 91-xxxxxxxxxx for India. If you do not add country code then this must give wrong information of the phone number. After tracing you will get country of approval of the number, SIM technology and the telecom operator of phone number etc.
Some other websites for tracing mobile numbers
www.mobilenumbertracker.com
www.trackmobi.in/mobile.php
www.Hacktrix.com
www.indiatrace.com
www.internet4mobile.com
www.indiaonapage.com
www.freephonetracer.com
www.fonefinder.com
www.fonefinder.net (with query form)

Conclusion
These numbers are very important in terms of security because these make protected us from illegal activities. International Numbering Plans are specialized in world-wide (tele) communications and offers a range of on-line services. Use online analysis tools for finding out information about specific numbers. Analysis can also be done on phone numbers. With the help of a website named as www.numberingpans.com you can get information related to your cell phone by using these international numbers.

Acknowledgement
I pay esteem thanks to my parents for their incredible support and also feel gratitude for the head of the institution. Also my sincere thanks to all the faculty members of department of computer science. The author is also thankfull to anonymous reviewers for their constructive remark and suggestions.

References
[1] *ETSI, ETSI Recommendation GSM* 11.11, *Specifications of the SIM-ME Interface*.
[2] Phone firms defend security record (2011) *BBC News*. 25.
[3] GSM Europe *GSME proposals regarding mobile theft and IMEI security*.
[4] *http://www.gsm-security.net/faq/imei-international-mobile-equipment-identity-gsm.shtml*.
[5] *http://en.wikipedia.org/wiki/International_Mobile_Subscriber_Identity*.
[6] *http://www.answers.com/topic/mobile-phone*.
[7] *http://schematicsdiagram.blogspot.com/2011/07/how-to-locate-imei-number-on-cell.html*.
[8] *http://www.techlineinfo.com/how-to-get-imei-number-legally-in-india-for-chinese*-mobiles/.
[9] *http://www.ehow.com/facts_5032620_imsi.html*.
[10] *http://www.esato.com/archive/t.php/t-24639,1.html*.
[11] *http://www.forensicswiki.org/wiki/SIM_Cards*.
[12] Daily news paper (2011) *HINDUSTAN*.