Cellular Data Jammers

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Cellular devices have become integral part of our life and it will be, till dooms day in one way or the other. The broadband and Wi-Fi is the basic necessary ingredient of our life, it has multiple advantages but few disadvantages are such that it keeps our life at risk. People working in manufacturing units are prone to fatal accidents if they are constantly buzzed and similarly many more examples are there. This White paper deals with a problem and its impact that arises from cellular data that is used in different places where it should not be used. By the end of this white paper, my objective is to give a concept to the world to create a device like Jammer that jams only cellular data.

Index Terms- GPRS, GSM, GGSN, SGSN, GTP

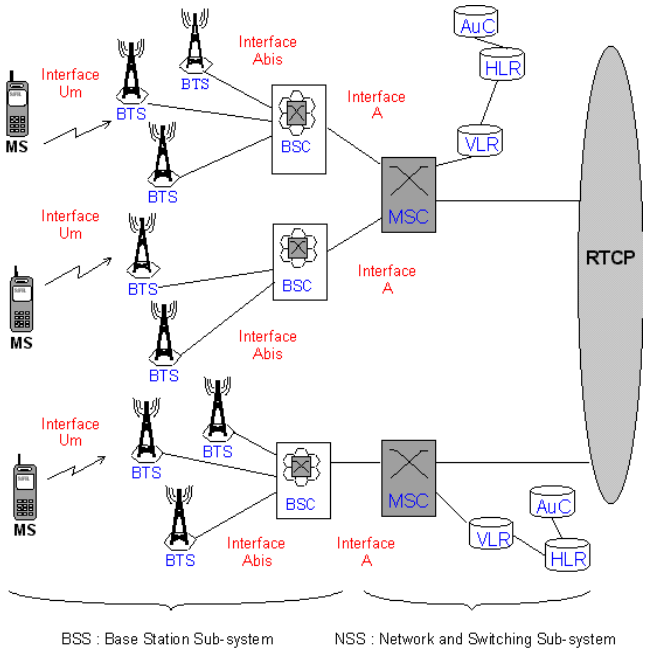
I. Introduction

This White paper deals with a problem of downgrading productivity at work places be it in any department of any work culture. We have tried to use Sapience as self improvement tool, but smart phones and the social networking sites is a deadly combination which causes downfall of the productivity more at IT majors with many other organization. There are surveys which show that our Smartphone devices have hindered our productivity. Around 76% workers check personal mail during office hours, 61% take personal calls and 35% post on social media and almost everyone who has a Smartphone with internet connection check their devices for latest updates on social networking sites. Although technology is supposed to make our professional lives more productive, the results of the survey show resources are wasting at least some of their time at work not working. We are a click away from distractions from our personal lives like Facebook, Twitter, and Candy Crush Saga. This blurring of the personal and the professional lines is coined with term "connectivity conundrum." By Terrie Campbell, vice president of Strategic Marketing at Ricoh Americas Corporation, the company that conducted the study. Take a stroll on the floor, and you will see maximum employees have their eyes glued to their cell phones, updating status or checking message on their social networking sites. There are Jammers which can jam the signals and hence your phone is of no use (means you can't make call, or surf the net), but these jammers are ban in countries like US of A. So, the proposal is to make jammers which can disrupt only the mobile data which turn will bar the user from using the internet on phone (Calls and Texting are allowed).

II. How does mobile phone and cellular data works

A cellular network is a radio network scattered over territory through cells where each cell includes a permanent location transceiver known as base station. These cells together provide broadcasting coverage over larger geographical areas. User equipment (UE), such as mobile phones, is able to communicate even if the equipment is moving through cells during transmission.

Cellular networks give subscribers advanced features over unconventional solutions, including amplified capacity, undersized battery power usage, a larger geological coverage area and reduced intrusion from other signals. The cellular technologies include the Global System for Mobile Communication, GPRS, 3GSM and CDMA.



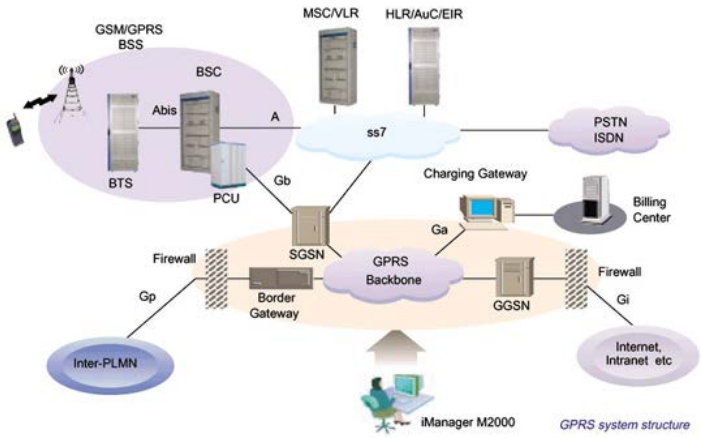
Cellular network technology supports a hierarchical configuration formed by the base transceiver station (BTS), mobile switching center (MSC), location registers and public switched telephone network (PSTN).The BTS enables cellular equipments to make direct communication with cell phones. The unit acts as a base station to route calls to the destination base center controller. The base station controller (BSC) coordinates with the MSC to interface with the PSTN, home location register (HLR), and visitor location register (VLR) to route the calls toward different base center controllers.

Cellular networks preserve information for tracking the location of their subscribers' mobile devices. In response, cellular devices are also operational with the details of suitable channels for signals from the cellular network systems. These channels are further divided into two fields:

- Strong Dedicated Control Channel: Used to send out digital information to a mobile phone from the base station and vice versa.

- Strong Paging Channel: When a call is routed then it is used for tracking the cell phone by MSC.

A normal cell site offers geographical reporting between 9 and 21 miles. The base station is accountable for monitoring the level of the signals when a call is made from a mobile phone. When the consumer moves away from the geographical coverage area of the tower (base station), the signal falls. Then base station makes a request to the MSC to transfer the control to another base station that is receiving the strongest signals without notifying the consumer; this is called handover. Cellular networks often encounter ecological interruptions like power cables, or moving tower crane or **the frequencies of other devices (which can be used as Jammer)**.



The General Packet Radio Service, GPRS, adds functionality like packet-switched to GSM, which is fundamentally circuit switched. GPRS is the crucial enabler for always working data connection for applications such as web browsing and (PTT) Push-to-Talk over Cellular.
GPRS was introduced into the GSM specifications in Release 97 and usability was further approved in Releases 98 and 99. It offers quicker data rates than plain GSM by aggregating several GSM time slots into a single bearer. Most operators do not offer such astronomical rates, because if a slot is being used for a GPRS carrier, it is not available for other traffic. Also, not all cells are able to aggregate all combinations of slots.
Mobile terminals are further classified according to whether or not they can handle simultaneous GSM and GPRS connections:
class A = both simultaneously,
class B = GPRS connection interrupted during a GSM call, automatically connected at end of call,
class C = manual GSM / GPRS mode switching.
Further data rate increases have been achieved with the introduction of EDGE (Enhanced Data rates for Global Evolution).
Network node which wires the use of GPRS in the GSM hub system is called GSN. All GSNs should have a *Gn* interface and support the GPRS tunneling protocol. There are two key form of the GSN,

1) Gateway GPRS Support Node
2) Serving GPRS Support node.

Gateway GPRS support node (GGSN)

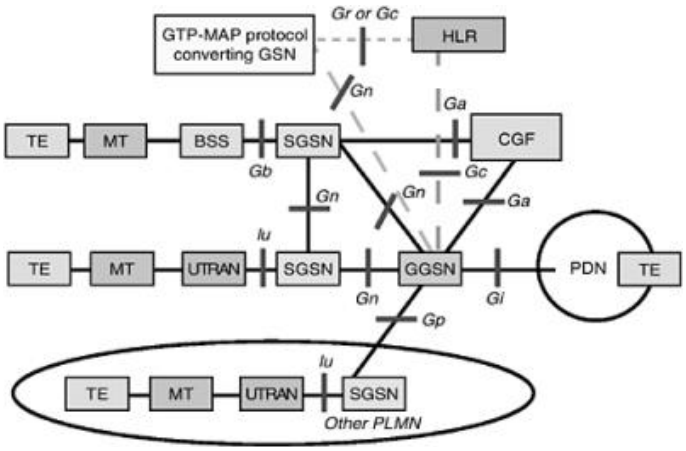
The gateway GPRS support node (GGSN) is a main constituent of the GPRS network. The GGSN is accountable for the internetworking between the GPRS network and external packet switched networks.
From an external network's point of view, the GGSN is a router to a subordinate-network, When the GGSN receives data addressed to a specific user, it checks if the subscriber is available and active. If subscriber is then, the GGSN forwards the data to the SGSN serving the mobile user, but if the mobile subscriber is not active, then the data is discarded. While, mobile-originated packets are routed to the right network by the GGSN.
The GGSN is the anchor point that enables the mobility of the user terminal in the GPRS/UMTS networks. It carries out the role in GPRS corresponding to the home agent in Mobile Internet Protocol. It maintains routing necessary to channel the protocol data units (PDUs) to the SGSN that services a particular MS (mobile station).
The GGSN converts the GPRS packets coming from the SGSN into the appropriate packet data protocol (PDP) format and sends them out on the consequent packet data network. On the other hand, PDP addresses of incoming data packets are converted to the GSM address of the destination user. The re-addressed packets are sent to the responsible SGSN. For this reason, the GGSN stores the existing SGSN address of the consumer and his or her profile in its location register. The GGSN is the default router for the connected user equipment (UE). The GGSN also performs authentication and charging functions.

Serving GPRS support node (SGSN)

A serving GPRS support node (SGSN) is in charge for the delivery of data packets from and to the mobile stations within its geographical service area. Its task comprises of packet transfer and routing, logical link management, mobility management, and charging and authentication functions. The location register of the SGSN stores site information (e.g., current cell, current VLR) and user profiles (e.g., IMSI, address used in the packet data network) of all GPRS users registered with it.

GPRS Tunneling Protocol (GTP)

The GPRS Tunneling Protocol (GTP) is the protocol between GPRS Support Nodes (GSNs) in the Universal Mobile Telephone Systems/General Packet Radio Systems (UMTS/GPRS) network. It includes both the GTP (i.e.) first is signaling and control (GTP-C) and second is user data transfer (GTP-U) procedures. There are two different types of tunnels which is either network signaling or control for control purposes and for genuine user data.



III. MODIFICATION IN JAMMERS

A **mobile phone jammer** is an instrument used to prevent cellular phones from receiving signals from base stations. The jammer successfully blocks cellular phones. These devices can be used in basically any spot, but are found mostly in places where a phone call would be particularly disturbing because silence is expected. Interrupting a cell phone is the same as jamming any other type of radio communication. Jamming equipment transmits same radio frequencies as the mobile phone, disrupting the communication between the phone and the cell-phone base station in the tower. The jammer denies service of the radio spectrum to the cell-phone users within range of the jamming device. Jamming equipments overshadow the mobile phone by transmitting a signal on the same frequency and at a high enough power that the two signals run into each other and cancel each other out. Mobile phones are intended to add power if they experience low-level intrusion, so the jammer must distinguish and match the power amplification from the phone.

IV. Idea

Jammers disrupt the radio frequencies and creates disturbance in whole network, which is prohibited in many nations like Australia, Brazil, Canada and many more and this jamming is unethical also. The GGSN converts incoming data traffic from mobile users (via the SGSN) and forwards it to the significant network, and vice versa.

So, for instance, a Google query from a smart phone would be routed via the SGSN to the GGSN and sent on as a query to the Internet search engine, and then the process would be reversed for the reply to the phone user.

We can stop the conversion of data traffic from GGSN then it cannot be forwarded to relevant network and then we can stop the internet on phone without disrupting the network.

In this calling will not be barred but the data traffic only.

Hence we can use those jammers in the organizations, factories and several other places where more attention is required then social networking.

REFERENCES

[1] Terrie Campbell, https://www.ricoh-usa.com.
[2] https://en.wikipedia.org/wiki/Cellular_network
[3] http://en.wikipedia.org/wiki/GPRS_core_network
[4] http://en.wikipedia.org/wiki/General_Packet_Radio_Service
[5] http://www.3gpp.org/specifications/releases

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