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A New Approach to Minimise Network Blocking In 4g for Better Accessibility

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Abstract: *Mobile communications systems revolutionized the way people communicate, joining together communications and mobility. Along way in a remarkably short time has been achieved in the history of wireless. Evolution of wireless access technologies is about to reach its fourth generation (4G).The first generation (1G) has fulfilled the basic mobile voice, while the second generation (2G) has introduced capacity and coverage. This is followed by the third generation (3G), which has quest for data at higher speeds to open the gates for truly "mobile broadband" experience, which will be further realized by the fourth generation (4G).The Fourth generation (4G) will provide access to wide range of telecommunication services, including advanced mobile services, supported by mobile and fixed networks. In today's Internet these applications are not subject to blocking, therefore the growth of popularity of these applications may endanger the stability of the Internet. In this paper, we propose a novel model to have more accessibility to network through duplication strategy*

Keywords: *CDMA ,GSM, NETWORK BLOCKING, CORE SERVER, SERVER PORT,2G,3G,4G.*

Introduction

1. First generation (Analog):

First-generation mobile systems used analog transmission for speech services. In 1979, the first cellular system in the world became operational by Nippon Telephone and Telegraph (NTT) in Tokyo, Japan. Two years later, the cellular epoch reached Europe. In the United States, the Advanced Mobile Phone System (AMPS) was launched in 1982. The two most popular analogue systems were Nordic Mobile Telephones (NMT) and Total Access Communication Systems (TACS). The system was allocated a 40-MHz bandwidth within the 800 to 900MHz frequency range by the Federal Communications Commission (FCC) for AMPS. In fact, the smallest reuse actor that would fulfill the 18db signal-to-interference ratio (SIR) using 120-degree directional antennas was found to be 7. Hence, a 7-cell reuse pattern was adopted for AMPS. Transmissions from the base stations to mobiles occur over the forward channel using frequencies between 869-894MHz.The reverse channel is used for transmissions from mobiles to base station, using frequencies between 824-849 MHz AMPS and TACS use the frequency modulation (FM) technique for radio transmission. Traffic is multiplexed onto an FDMA (frequency division multiple access)

2. The Second-generation & Phase 2+ Systems (Digital):

Second-generation (2G) mobile systems were introduced in the end of 1980s.. Compared to first-generation systems, second-generation (2G) systems use digital multiple access technology, such as TDMA (time division multiple access) and CDMA (code division multiple access).Consequently, compared with first-generation systems, higher spectrum efficiency, better data services, and more advanced roaming were offered by 2G systems. Global System for Mobile Communications, or GSM, uses TDMA technology to support multiple users. New technologies have been developed based on the

original GSM system, leading to some more advanced systems known as 2.5 Generation (2.5G) systems.

2.1. GSM (Global System for Mobile Communication): The main element of this system are the BSS (Base Station Subsystem), in which there are BTS (Base Transceiver Station) and BSC (Base Station Controllers); and the NSS (Network Switching Subsystem), in which there is the MSC (Mobile Switching Centre); VLR(Visitor Location Register); HLR (Home Location Register); AC (Authentication Centre) and EIR(Equipment Identity Register). This network is capable of providing all the basic services up to 9.6kbps, fax, etc. This GSM network also has an extension to the fixed telephony network. A new design was introduced into the mobile switching center of second-generation systems. In particular, the use of base station controllers (BSCs) lightens the load placed on the MSC (mobile switching center) found in first generation systems. This design allows the interface between the MSC and BSC to be standardized. Hence, considerable attention was devoted to interoperability and standardization in second-generation systems so that carrier could employ different manufacturers for the MSC and BSCs. In addition to enhancements in MSC design, the mobile-assisted handoff mechanism was introduced. By sensing signals received from adjacent base stations, a mobile unit can trigger a handoff by performing explicit signaling with the network.

2.2 .GSM and VAS (Value Added Services): The next advancement in the GSM system was the addition of two platforms, called Voice Mail Service (VMS) and the Short Message Service Centre (SMSC). The SMSC proved to be incredibly commercially successful, so much so that in some networks the SMS traffic constitutes a major part of the total traffic.Along with VAS, IN (Intelligent services) also made its mark in the GSM system, with its advantage of giving the operators the chance to create a whole range of new services. Fraud management and 'prepaid' services are the result of the IN service. GSM and GPRS (General Packet Radio Services): As requirement for sending data on the air-interface increased, new elements such as SGSN (Servicing GPRS) and GGSN (Gateway GPRS) were added to the existing GSM system. These elements made it possible to send packet data on the air interface. This part of the network handling the packet data is also called the 'packet core network'. it also contains the IP routers, firewall servers and DNS (Domain Name Servers). This enables wireless access to the internet and bit rate reaching to 150 kbps in optimum conditions. The move into the 2.5G world began with General Packet Radio Service (GPRS).

GPRS is a radio technology for GSM networks that adds packet-switching protocols, shorter setup time for ISP connections, and the possibility to charge by the amount of data sent, rather than connection time. Packet switching is a technique whereby the information (voice or data) to be sent is broken up into packets, of at most a few Kbytes each, which are then routed by the network between different destinations based on addressing data within each packet. Use of network resources is optimized as the resources are needed only during the handling of each packet. GPRS supports flexible data transmission rates as well as continuous connection to the network. GPRS is the most significant step towards 3G.

3. Third Generation (WCDMA in UMTS, CDMA2000 & TD-SCDMA):

3G uses Wide Brand Wireless Network with which clarity is increased. 3G telecommunication networks support services that provide an information transfer rate of at least 2Mbps.In EDGE, high-volume movement of data was possible, but still the packet transfer on the air-interface behaves like a circuit switches call. Thus part of this packet connection efficiency is lost in the circuit switch environment. Moreover, the standards for developing the networks were different for different parts of the world. Hence, it was decided to have a network which provides services independent of the technology platform and whose network design standards are same globally. Thus 3G is formed. 3G is not one standard; it is a family of standards which can all work together .An organization called 3rd Generation Partnership Project (3GPP) has continued the work by defining a mobile system that fulfills the IMT-2000 standard. In Europe, it was called UMTS (Universal Terrestrial Mobile System), which is ETSI-driven. IMT2000 is the ITU-T name for the third generation system, while cdma2000 is the name of the American 3G variant. WCDMA is the air-interface technology for the UMTS. The main components includes BS
(Base Station) or nod B, RNC (Radio Network Controller), apart from WMSC (Wideband CDMA Mobile Switching Centre) and SGSN/GGSN. 3G networks enable network operators to offer users a wider range of more advanced services while achieving greater network capacity through improved spectral efficiency.

4. Fourth Generation (All-IP):

The first successful field trial for 4G was conducted in Tokyo, Japan on June 23rd, 2005.To use 4G services, multimode user terminals should be able to select the target wireless systems. In current GSM systems, base stations periodically broadcast signaling messages for service subscription to mobile stations. However, this process becomes complicated in 4G heterogeneous systems because of the differences in wireless technologies and access protocols. To provide wireless services at anytime and anywhere, terminal mobility is a must in 4G infrastructure. Terminal mobility allows

mobile clients to roam across geographic boundaries of wireless networks. There are two main issues in terminal mobility: *location management and handoff management*. With location management, the system tracks and locates a mobile terminal for possible connection. Location management involves handling all the information about the roaming terminals, such as original and current located cells, authentication information etc. On the other hand, handoff management maintains ongoing communications when the terminal roams. Mobile IPv6 (MIPv6) is a standardized IP-based mobility protocol for IPv6 wireless systems. In this design, each terminal has an IPv6 home address. Whenever the terminal moves outside the local network, the home address becomes invalid, and the terminal obtains a newIPv6 address (called a care-of address) in the visited network. The design and optimization of upcoming radio access techniques and a further evolution of the existing system, the Third Generation Partnership Project (3GPP) had laid down the foundations of the future Long Term Evolution (LTE) advanced standards-the 3GPPcandidate for 4G. The target values of peak spectrum efficiency for LTE Advanced systems were set to30bps/Hz and 15 Bps/Hz in downlink and uplink transmission respectively. Apart from the multiple access schemes, enhanced multiple-input multiple-output (MIMO) channel transmission techniques and extensive coordination among multiple cell sites called coordinated multipoint (CoMP) transmission/reception were accepted as the key techniques for LTE

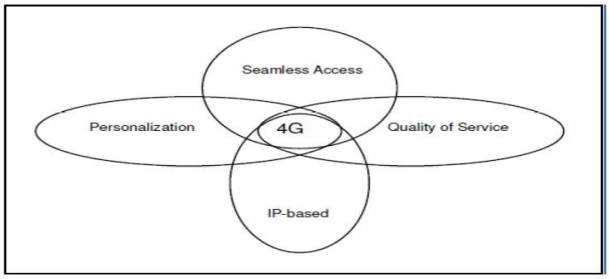


Fig1 :4G overview

4.1 Comparison Between Different Network Strategies:

In table1 shows the characteristics of mobile technologies, here if we observed the best results of 4g as compared to other technology, as 5g is in development, the 4g becomes the essential data network for communication.

4.2 Advanced Features of 4G Technology

It has a flexible structure and can be easily extended. Therefore, it plays a role of true multimedia protocol that controls and Transports:

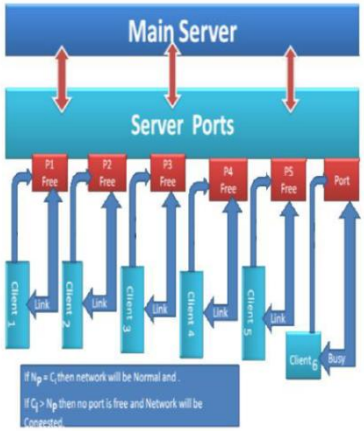
1. Emails
2. Pictures
3. WEB links
4. Videos Service scripts
5. Speech
6. Multiparty sessions

Table 1: COMPARISON OF ALL GENERATIONS OF MOBILE TECHNOLOGIES

Technology ⇨ / Feature ⇩	1G	2G	3G	4G	5G
Start/ Deployment	1970 – 1980	1990 – 2004	2004-2010	Now	Soon (probably 2020)
Data Bandwidth	2kbps	64kbps	2Mbps	1 Gbps	Higher than 1Gbps
Technology	Analog Cellular Technology	Digital Cellular Technology	CDMA 2000 (1xRTT, EVDO) UMTS, EDGE	Wi-Max LTE Wi-Fi	WWWW(coming soon)
Service	Mobile Telephony (Voice)	Digital voice, SMS, Higher capacity packetized data	Integrated high quality audio, video and data	Dynamic Information access, Wearable devices	Dynamic Information access, Wearable devices with AI Capabilities
Multiplexing	FDMA	TDMA, CDMA	CDMA	CDMA	CDMA
Switching	Circuit	Circuit, Packet	Packet	All Packet	All Packet
Core Network	PSTN	PSTN	Packet N/W	Internet	Internet

4.3 Mechanism of 4G:

When users send request to foremost server then server allot the open port to users. If port is not open that means user is facing blocking because users' request in wait state



If Np = Ci then network is normal.

If Np > Ci then users' are facing network blocking problem

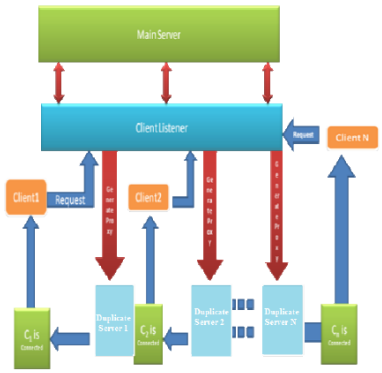
Pseudo Code:

"*Step 1: Ms=Core Server, Sp=Server Port, Client= C;*
Step 2: Ci=Ms(Client request to server)
If (Sp==Available)
Then assign port to Client;
Else if
Server port is busy wait;
Else
Server can't be connected, unavailable
Step 3: for Ci=Np; i.e. if [no of client request is = no of port]

For (Ci=1; Ci<=Np; Ci++)
Assign Np = Ci;
Step 4: Repeat while (Np>=Ci);
Step 5: End;"

4.3.1 Proposed Mechanism:

The proposed model is depending on a duplicate (A server that listens only one client request at a time) server mechanism. When any client will send any request then the client listener module will listen the client request and then it will send notification to the core sever about the requested client, then the core server will instruct to the client listener and it will generate new impermanent server for the requested client which is known as the duplicate server. The idea behind proposed model is that when any client will send his request for connecting to the server then the client request will be listened by the client listener and the client listener will send a request to the core server. The core server will generate a duplicate server for the requested client. As the client will complete his task then this server will be automatically destroyed. So by using this policy, network blocking can be avoided because there is no waiting policy is used as we are using in our proposed algorithm



Pseudo Code:
Step 1: create a socket (duplicate server)
Step 2: bind to a well-known port
Step 3: place in passive mode
Step 4: while (1)
{
Accept the next connection
Step 5: while (client writes)
{
read a client request perform requested action send a reply
}
close the client socket
}
Close the passive socket

Conclusion:

Mobile Wireless Communication Technology is going to be a new revolution in mobile market. With the coming out of cell phone alike to personal data assistant (PDA) now our whole office is in our finger tips or in our phone. The first generation (1G) has fulfilled the basic mobile voice, while the second generation (2G) has introduced capacity and coverage. This is followed by the third generation (3G), which has quest for data at higher speeds to open the gates for truly "mobile broadband" experience, which will be further realized by the fourth generation (4G). The problem raised in today time of network blocking when accessing the internet. So, our future work will be implementing to mitigate the blocking control and accessing speed of the internet via mobile should be very fast and there will not be any blocking situation arises while accessing data from Internet.

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