Development of Centralised Monitoring and Alerting System for Real Time Core Network

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Abstract—

The Present Mobile environment built on the IP infrastructure backbone with various routers and switches. we have to monitor the these elements round the clock because of one network element outage leads to service outage hence degrade Quality of service(QoS) like congestion and overload. To combat this one we need to have automated system to monitor the network periodically and alert may be given to related staff who are responsible by SMS or Email. It monitors the underlying infrastructure and provides instant alerts during circuit outages or performance degradation of network services. It therefore helps the Network team be proactive in identifying the outages so as to report back to their clients on where problems lie whenever a circuit loses connectivity on the interfaces, This Alerting system shoots an SMS alert to us on the connectivity loss with relevant details.Through proactive monitoring of its WAN links and Network services performance, Alerting system has been able to Reduce the circuit outages, thereby safeguarding a critical revenue stream. Enhance the efficiency and effectiveness of its Network team and client facing team through faster fault detection.

Keywords—QoS,WAN,IP,Mobile,Network

I. INTRODUCTION

With the wide spread use of cellular networks, this approach is also popular when small amount of data is to be transferred through the network. Extensive work has been carried out by researchers using this approach especially in telecommunication field. Describe a remote monitoring system based on SMS of GSM. The system includes two parts which are the monitoring center and the remote monitoring station. The monitoring center consists of a computer(at MSC) and a TC35 GSM communication module. The computer and TC35 are connected by RS232. The remote monitoring station includes a TC35 GSM communication module, a MSP430F149 MCU, a display unit, various sensors, data gathering and processing unit. Developed a tele-monitoring system, based on short message service (SMS), to remotely monitor the long-term connectivity levels of routing path in the natural environment. Connectivity is measured by an accelerometer-based portable unit, worn by each monitored subject. The portable unit houses the Analog Devices ADuC812S microcontroller board, Falcon A2D-1 GSM modem, and a battery-based power supply. Two integrated accelerometers are connected to the portable unit through the analog inputs of the microcontroller. Connectivity level summaries are transmitted hourly, as an SMS message, directly from the portable unit to a remote server for long-term analysis. Each subject's connection levels are monitored using custom-designed mobility alert software, and the appropriate medical personnel are alerted by SMS if the subject's mobility levels decrease. (Jiang et al., 2008) proposed a system for early diagnosis of hypertension and other chronic diseases. The proposed design consists of three main parts: a monitoring System measurement unit, a server unit and a terminal unit. Router connectivity is detected using data acquired by sensors intelligently using DSP microchip. The data is then transmitted to the remote server unit located at Mobile Switching Centre(MSC) by using Short Messaging Service (SMS), and notification information is sent to the terminal unit to inform users if there are any circuit outages or leakages.. (Alheraish, 2004) implemented home security system by means of GSM cellular communication network using microcontroller 89X52 and Sony Ericsson GM-47 GSM module. This system enables far end user through SMS facility to monitor the state of home door, provide password facility for key based door lock and control home lighting system. Described a remote medical monitoring system based on GSM (Global System for Mobile communications) network. This system takes advantage of the powerful GSM network to implement remote communication in the form of short messages and uses FPGA as the

control center to realize the family medical monitoring network. .

II. LITERATURE SURVEY

The literature related to the research topic has been reviewed for last twenty years in order to find out work carried out by various researchers. There are many systems for remote monitoring and control designed as commercial products or experimental research platforms. It is noticed that most of the research carried out belongs to the following categories a. Internet based Monitoring using Servers, GPRS modems, etc. with different approaches. b. GSM-SMS protocols using GSM module individually or in combination with Internet Technologies. c. Monitoring using Wireless Sensor Networks. d. Wireless Monitoring using Bluetooth, Wi-Fi, Zigbee and RF. e. Applications have varied widely like Home Automation, Security Systems, Biomedical applications, Agriculture, Environment, Reservoir, Bridge health monitoring, etc.

III. TECHNICAL REQUIREMTS

The following components are required for the development of this work such as

- All IP network Architecture
- 3G PP Specifications.
- SMS,SMSC.SMPP

A. ALL IP NETWORK ARCHITECTURE

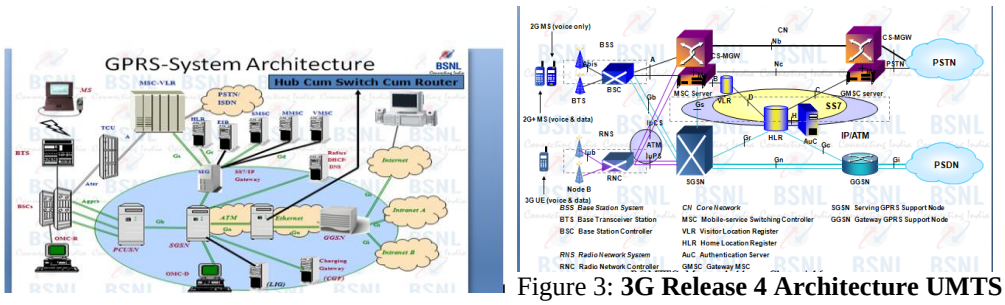


Figure 3: **3G Release 4 Architecture UMTS**

The first GPRS product release (V12.4) must support IP and interworking with internet/intranet. Only one SGSN will be required due to the relatively low number of users.Interconnection between the GGSN and GSM/NSS nodes (MSC/VLR, HLR and SMSC), requires an SS7/IP Gateway (SIG) to link the IP backbone with Gs, Gr and Gd interfaces.To manage IP address, a server is provided, which contains these two functions:Domain Name Server (DNS) to translate Domain Names to IP addresses and vice versa.

Dynamic Host Configuration Protocol (DHCP) to allow automatic re-addressing for mobile hosts.The GPRS backbone network permits point-to-point GPRS calls, interworking with the BSS, HLR, MSC, SMSC, and the Internet.These services are supported via the following interfaces: **Ga-** Between SGSN or GGSN and a CGF (Charging Gateway Function)**Gb-** Between PCUSN (Packet Control Unit Support Node) and SGSN, using Frame Relay. **Gr-** Between SGSN and HLR (via SIG), extension of MAP **Gn-** Between SGSN and GGSN using GTP protocol (tunnel)**Gi-** Between GGSN and PDNs (Public Data Networks - IP and X.25) **Gs-** Between SGSN and MSC/VLR (via SIG), for some simultaneous GPRS andGSM operation (same as BSSMAP but optional) **Gd-** Between SGSN and SMS-C (via SIG) to deliver SMS messages via GPRS**Ge-** Between SGSN and SCP (Service Control Point) via SIG to deliver Camel messages **Lg-** Between GMLC (Gateway Mobile Location Center) and SIG **Le-** Between GMLC and LCS (Location Services) clients**LH-** Between GMLC and HLR

B. 3G PP Specifications

1. Release 3 (known as Rel' 99)
   - Compatibility with GSM
   - Inter-operability
   - Services
   - UTRAN specifications, including WCDMA air interface (Uu)
2. Release 4 (known as Rel'00)
   a. Release 4 mainly specifies All-IP core network.

   b. The role of the MSC/VLR will change; the traffic will no longer go through the element, but it will control the calls as a server.

HSDPA – Release 5:

- HSDPA is evolved from release 99 WCDMA systems
- Provides a two-fold increase in air interface capacity
- Provides a five-fold increase in data speeds in downlink direction
- Downlink peak data rate is 14 Mbps

  Uplink peak data rate is 0.4 Mbps

IMS- Release 5

Call Session Control Function (CSCF) – serving (SIP Registrar, session control, generates CDRs), proxy (first contact point

of ue, forwards sip requests to home network), interrogating (Gateway)
SLF (Subs Location Function)(optional, if n/w is big when hlr not stores all data)
3 AS – Application server
1. Open Service Access (OSA) Service Capability Server (scs)
2. IP Multimedia service switching function (IM-SSF)
3. SIP AS
Multimedia Resource Function Controller (MRFC)
Multimedia Resource Function Processor (MRFP)

HSUPA – Release 6:

- Downlink peak data rate is 14 Mbps
- Uplink peak data rate is 5.7 Mbps

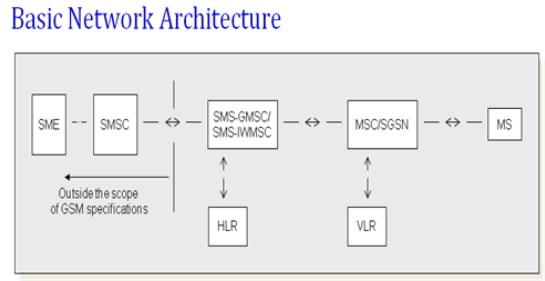
HSPA+ - Release 7/8:

- Evolved High-Speed Packet Access
- Downlink peak data rate is 28/42 Mbps
- Uplink peak data rate is 11 Mbps
- Multiple Input Multiple Output
- 64 QAM
- Optional All-IP architecture

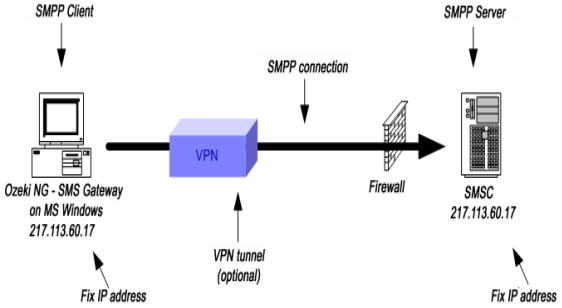
LTE - Release 8/9:

- Last step towards the 4th Generation of radio technologies.
- All-IP signaling and networking
- Flat Architecture turns cellular base station into an IP router
- Downlink peak data rate is 100 Mbps
- Uplink peak data rate is 50 Mbps

C. SMS,SMSC,SMPP



- **SMS:**-SMS stands for Short Message Service
- SMS was first introduced in 1991 in Europe as a text messaging service based on European Telecommunications Standards Institute (ETSI) standards for mobile networks
- SMS is being used in a wide range of social and business applications such as electronic voting, delivery of stock quotations, delivery of e-mail notification
- SMS is currently supported on the major mobile network technologies including:
  - **GSM** (Global System for Mobile communications)
  - **GPRS** (General Packet Radio Service)
  - **CDMA** (Carrier Division Multiple Access)
- SMS supports the sending and receiving of text, images, animation and sound
- SMS messages are originated and received by Short Messaging Entities (SME). Examples of SMEs are: mobile phones; servers; personal computers .



IV. IMPLEMENTATION

MONITORING OF GE-LINKS USING TELNET

. TELNET PROGRAM PROCESS:-

- Connect to MYSQL data base [LOCAL HOST TO IP ADDRESS]
- Select IP address , UserID,Password,Router Type from the network element table send same to the telnet function
- Assign default data to the variables which are required to TELNET LOGIN
- Create SOCKET with TCP
- Copy the command to see the interface status into COMMAND code(APPROPRIATE COMMAND)
- Fill the server structure with IP and PORT

EX: - IP→ROUTER, PORT → DEFAULT (23)

- Connect to the server (ROUTER / SWITCH) with CONNECT command
- Create THREAD to receive the data from the SERVER
- Send text data forward by USERID and PASSWORD to the SERVER
- Send COMMAND code
- In THREAD FUNCTION it receives data from SERVER and stores the same data in VAR/ LOG/ TELBUFF

- Identify the interfaces which are required to the monitor
- Copy the present status to the previous status
- Compare the previous status with the present status
- Update the table of network log

Prepare the meaningful SMS & Identify the responsible persons for that interface

SMS ALERTS FOR GE-LINK FAILURE

SMS BIND & SMS SEND PROGRAM PROCESS:-

- Get the SMSC Data from data base MCA-INPORT

EX:-SMS: IP, USERIP, PASSWORD

- Bind to the SMSC with the above data by calling from SMS BIND
- Read theSMS.SMS_DATA and copy it to the SMS TEMP
- Get the data from the server [CALLED NO, SMS CONTENT]
- Prepare the SMS Submit REQUEST
- SEND it to SMS
- TRUNCATE the data in TEMP as well as SMS

V. Results & Discussions

```
penuballi@penuballi-HP-Notebook:~$ telnet 192.168.3.33
Trying 192.168.3.33...
Connected to 192.168.3.33.
Escape character is '^]'.


User Access Verification

Password:
HYDERABAD>en
Password:
HYDERABAD#show ip i
HYDERABAD#show ip i?
icmp  igmp  inspect  interface
ips   irdp

HYDERABAD#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        192.168.3.33    YES NVRAM  up                    up
FastEthernet0/1        192.168.3.5     YES NVRAM  up                    up
Serial0/0/0            172.17.0.2      YES NVRAM  down                  down
Serial0/1/0            unassigned      YES NVRAM  administratively down down
Serial0/1/1            unassigned      YES NVRAM  administratively down down
```

Fig 1.login result

```
HYDERABAD#
HYDERABAD#
HYDERABAD#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        192.168.3.33    YES NVRAM  up                    up
FastEthernet0/1        192.168.3.5     YES NVRAM  up                    up
Serial0/0/0            172.17.0.2      YES NVRAM  up                    up
Serial0/1/0            unassigned      YES NVRAM  administratively down down
Serial0/1/1            unassigned      YES NVRAM  administratively down down
HYDERABAD#exit
Connection closed by foreign host.
```

Fig 2.shows the serial socket connections

SN	SourceEntity&Port	DestEntity&Port	NAME	STAT	MEDIA
1	H-VJA-P-B(2/0/0)	H-VKP-PE-B(1/0/2)	GE1	down	Mindi-VM(DWL47/14/2GE)+VM-VJA(SRM
2	Z-PTY-PE-A(0/1/0/3)	Z-KNL-PE-A(0/2/2/5)	GE	down	SD DXC(1.7)- KNL DXC(4.3)
3	Z-PTY-PE-A(0/2/2/4)	Z-SFD-PE-A(NA)	GE	down	SD-HD DWL-45/CHL 22.1, 10th flr L
4	Z-PTY-PE-B(0/2/2/4)	Z-SFD-PE-B(NA)	GE	down	SD-HD DWL-155/?7.2 10th floor L4/
5	Z-WGL-SW-A(0/1/0/16)	BTS/NodeB(NA)	GE16	down	HMK DXC 1.11(2nd24F(17,18))

Fig 3.status check box

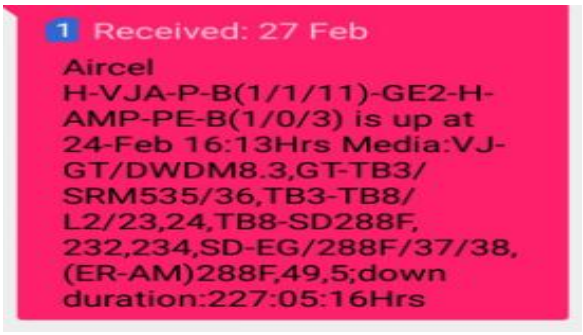


Fig 4. Alerting message to monitoring individual

VI. Conclusion & Future Scope

The GE-Links from Core Routers and Edge Routers are monitored. For every 15 minutes Present status and Previous Status are compared. If Present Status is not equal to Previous Status then SMS alert will be generated. This is used to decrease the work of a human being. Load at the routers when GE-Link will be increased. Packet Loss and Data loss will be decreased. GUI structure will be improved by IP.

Generally in monitoring there will be no logs with our project we propose you that we can also add some message logs in monitoring .In this project we have done in one server like this server, we can extend an array of servers in purpose of monitoring in departments like police, and also inpurpose of internal communication in hospitals. The GE-links from core routers and edge routers are monitored for every 1min which can be very useful for future generations.

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