

Analysis of Paging in LTE IMS Network for Circuit and Packet Switch Network

Ashish Gopal Baviskar¹, Harish Bhangale²

¹M.E Student, Department of Digital Electronics Engineering, G.H Raisoni Collage of Engineering, Jalgaon, Maharashtra. India

²H.O.D Department of Didital Electronics Engineering, G.H Raisoni Collage of Engineering, Jalgaon,

Maharashtra, India

ABSTRACT

The LTE based IMS system is the system with voice over ip support. The aim of this project is to implement the real time implemenation of how the IP packet being transfer in real time sinario,capture the same packet using captureing software and make the advanced analysis of protocol involved version, header length,decoding of mac acknowldgement being used for data transfer. For this project we using python to make the connection between two nodes, and TCL -TK programming language to implement real time packet transfer, using network stimulator 2, and ubentu linux is used to implement all praposed system because it is highly secure which is the most important criteria in any communication system

Keywords : Long Term Evolution, IP Multimedia Subsystem, 3GPP

I. INTRODUCTION

LTE is IP based network, In IP based network data and signaling is transmitted using packet, all the packet have some specific packet format, header field and version, the most critical thing in capturing and analysis of packet is decoding of mac header field in order to analysed the complete header and sub header, In this project we are going to implement the two nodes one as a server and another as a client make a socket module using python scripting laungauge . We consider client as our UE in LTE system and server being considerd as a lte network. Using Network stimulator 2 we can show real time how packet getting transfer in system, tcl-tk is the scripting langauge used to create a nodes such that communication between them is possible, one thing to rember is all this setup will be done in Linux Ubentu Enviroment Decoding the acknolgment message which is getting in reply and determine the information element which is transfer in packet in LTE network

II. PRAPOSED SYSTEM

The project is entirely software based and to implement the system

SOFTWARE TOOLS

- 1. Python 2.7
- 2. Wireshark tool
- 3 .Network stimulator 2

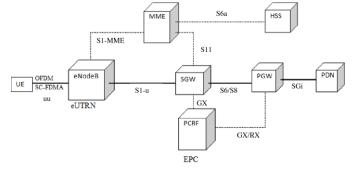


Figure 1 : System Block Diagram for Network

System block consist of

1. user equipmnt

2. evolved packet core (EPC)

3. PDN network

1. User Equipment

Terminal Equipment (TE) : This terminates the data streams.

Universal Integrated Circuit Card (UICC) : This is also known as the SIM card for LTE Equipment . It runs an application known as the Universal Subscriber Identity Module (USIM).

2. Evolved packet core (EPC)

2.1 Home Subscriber Server

The Home Subscriber Server (HSS) component has been carried forward from UMTS and GSM and is a central database that contains information about all the network operator's subscribers.

2.2 Packet Data Network

The Packet Data Network (PDN) Gateway (P-GW) communicates with the outside world ie. packet data networks PDN, using SGi interface. Each packet data network is identified by an access point name (APN). The PDN gateway has the same role as the GPRS support node (GGSN) and the serving GPRS support node (SGSN) with UMTS and GSM.

2.3 Serving Gateway

The serving gateway (S-GW) acts as a router, and forwards data between the base station and the PDN gateway.

2.4 Mobility management entity

The mobility management entity (MME) controls the high-level operation of the mobile by means of signalling messages and Home Subscriber Server (HSS).

2.5 The Policy Control and Charging Rules Function The Policy Control and Charging Rules Function (PCRF) is a component which is not shown in the above diagram but it is responsible for policy control decision-making, as well as for controlling the flowbased charging functionalities in the Policy Control Enforcement Function (PCEF), which resides in the P-GW.

III. PRATICAL IMPLEMENTATION OF SYSTEM

1. Python Socket Module

Python 2.7 is used to create the client server communication between the two nodes, in this approch we defined one node as a server and other as client and make a connection on any port. For that we need two seprated terminal or we also use single pc with virtual support

2. NS2 stimulation using TTCN

In ns2 we make a real time implementation of two nodes, which transfer the real time data between each other, we use TTCN scripting launage to implement that as shown in fig 2

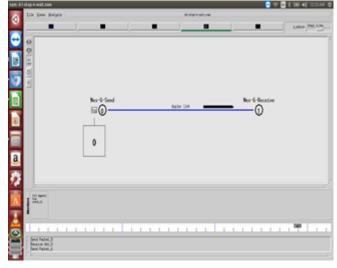


Figure 2 : NS2 Network node stimulation snapshot

3.3 Wireshark analysis

Wireshark is a protocol analyser tool used for capturing packet between the nodes, which determine the all information about transmitted packet like protocol used, version, header information, times laps, source and destination address, etc fig 3 show sample screen shot for the packet capture.

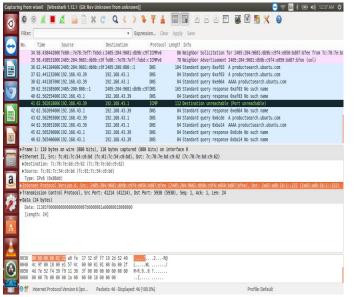


Figure 3 : wireshark capture IP packet analysis

IV. EXPERIMENTAL RESULT

As see in fig the the packet is captured in Wireshark tool we analysed the various field in Wireshark software we got source & destination of packet and protocol Used, IP version, byte length, header field, header data, As you see the capture packet complete analysis with all information source. At the end we got mac acknowdgment which is in hexadecimal format which is decode into binary field and from that we get the actual field of information

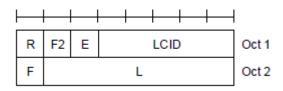


Figure 4 : MAC Header

For example we take one sample captured field UL-SCH : 20 06 1F 5F 09 72 43 FE 56 00 00 00 00 UL-SCH : 03 45 00 00 3C 33 63 00 00 80 01 00 00 00 00 .

Let me convert the first byte into binary format as follows :

03 = 00000011

Let's rearrange these bits according to MAC PDU diagram as follow

- * Bit 0 = R field = 0
- * Bit 1 = R field = 0
- * Bit 2 = E field = 0.

This means that this header does not have any other fields following this field and it the next byte is the start byte of MAC SDU or MAC CE or Padding'.

* Bit 3^{7} = LCID field = 11 in Binary = 3 in decimal. This means the logical channel number for this PDU is '3'.

This is the end of analysis. All the remaining part is user data

	Time	Source	Destination	Protocol	Length Info
	35 11.87193988	E 2405:200:800::1	2485:284:95a1:799a	:713045	112 Standard query response 8xd694 A 216.58.199.131
	36 11.87212999	12485:200:800::1	2485:284:95a1:799a	c7130N5	124 Standard query response 8x8587 AAAA 2404:6808:4009:80d::2003
	37 11.87218700	E2405:200:800::1	2485:284:95a1:799a	:713DNS	158 Standard query response 8x8c9a CNAVE pagead46.1.doubleclick.net A 216.58.289.1
	38 11.87221300	12405:200:800::1	2485:284:95a1:799a	:713DNS	170 Standard query response 0x596f CNAME pagead46.l.doubleclick.net AAAA 2404:6880
	39 11.87274289	12485:284:95a1:799a:71	2485:288:888:::1	DIG	99 Standard query Bxc539 A clients5.google.com
	48 11.87338588	12485:284:95a1:799a:71	2484:6888:4889:886	IC: 2E TOP	94 39455-443 [SYN] Sep=0 Win=20000 Len=0 WSS=1440 SACK PERM=1 TSva1=1143229 TSecr=1
	41 11.87314988	2405:204:95a1:799a:71	2485:298:888::1	DNS	99 Standard query Bx7b53 AAAA clients5.google.com
	42 11.87321999	146:24:51:79:71	2484:6888:4885:888	C:2ETCP	94 39456-443 [SYN] Seg=0 Win=20000 Len=0 MSS=1440 SACK PERI=1 TSva1=1143229 TSecr=
	43 11.87378399	2405:204:95a1:799a:71	2485:298:888::1	DNS	185 Standard query Bx6866 A lh3.googleusercontent.com
	44 11.87391409	2405:204:95a1:799a:71	2485:299:898::1	DNS	185 Standard query BuAdBe AAAA lh3.googleusercontent.com
	45 11.88618299	12485:200:800::1	2485:294:95a1:799a	:713DIS	132 Standard query response 0xe39b CNAME plus.1.google.com A 172.217.166.78
	45 11.89194588	2405:200:800::1	2485:284:95a1:799a	:713DNS	144 Standard query response 8x2264 CNAME plus.l.google.com AAAA 2464:6808:4889:886
	47 11.89228389	2405:200:800::1	2485:284:95a1:799a	:713 DNS	128 Standard query response 8x38a9 A 162.213.33.188 A 162.213.33.132
	ernet II Srr-	fr-41-3r-54-c8-bd [fr-4	1-7r-54-r8-h41 0ct	t 7r - 78 - 7e - h	d-r4-67 (7r-78-7a-bd-r4-67)
► Eti ► Int ▼ Use S D U ► C	ternet Protocol er Datagran Proto ource Port: 1600 estination Port: ength: 45	Version 6, Src: 2485:28 ocol, Src Port: 16000 0 (16000) 53 (53) [validation disabled]	4:95a1:799a:713f:7v	eba:43de:baf2	d:c9-82 [Tc:T8:Tebufc9-82] [2485:284-5561:7950:713f:786a-430c:1872], Bst: 2485:208-800:11 [2485:208-800:1]
▶ Int ▼USH Si Di USH Di USH Di USH Di USH Di USH Di USH Di USH Di USH Di USH Di USH Di USH Di Di Di Di Di Di Di Di Di Di Di Di Di	ternet Protocol ' er Datagran Prob ource Port: 1600 estination Port: ength: 45 hecksum: Bx6ccd Stream index: 17	Version 6, Src: 2405:28 ocol, Src Port: 16000 0 (16000) 53 (53) [validation disabled]]	4:95a1:799a:713f:7v	eba:43de:baf2	
>Eti >Ini ∀Usi S D U >C I T Doi	ternet Protocol er Datagran Prot ource Port: 1600 estination Port: ength: 45 hecksum: Bx6ccd	Version 6, Src: 2405:20 ocol, Src Port: 16000 (0 (16000) 53 (53) [validation disabled]] (query)	4:95a1:799a:713f:7v	eba:43de:baf2	
Eti → Ini → Use S D U → C P → Dor 1	ternet Protocol 1 er Datagram Proto ource Port: 1600 estination Port: ength: 45 hecksum: Bx6ccd Stream index: 17 main Name System	Version 6, Src: 2405:20 ocol, Src Port: 16000 (0 (16000) 53 (53) [validation disabled]] (query)	4:95a1:799a:713f:7v	eba:43de:baf2	
>Eti >Ini ∀Use D U >C [' *Dor I I T T	ternet Protocol / er Datagram Prob ource Port: 1800 estination Port: ength: 45 hecksum: Bx6ccd Stream index: 17 main Name System Response In: 511 ransaction ID: 8	Version 6, Src: 2405:28 ocol, Src Port: 16000 0 (15000) 53 (53) [validation disabled]] (query) wc530	4:95a1:799a:713f:7v	eba:43de:baf2	
► Eti ► Ini ► Use S D U ► O I T T ► F	ternet Protocol / er Datagram Prob ource Port: 1800 estination Port: ength: 45 hecksum: Budocol Stream index: 17 main Name System Response In: 511	Version 6, Src: 2405:28 ocol, Src Port: 16000 0 (15000) 53 (53) [validation disabled]] (query) wc530	4:95a1:799a:713f:7v	eba:43de:baf2	

Figure 4 : Wirshark analysis capture snapshot

V. CONCLUSIONS

In this Project we noticed that the message that we trasmitted in network and acknowledge that we

recived in feedback from network is contain some field which identify the packet in network, paging message in network is usd to awake the client for upcoming message from network

VI. REFERENCES

- Alexei Davydov and Gregory Morozov, "Multi-Point Single-User MIMO Transmissin Scheme for Communication Systems beyond LTE-Advanced", 83rd Vehicular Technology Conference (VTC Spring), IEEE
- [2]. Amitava Ghosh, Rapeepat Ratasuk, Bishwarup Mondal, Nitin Mangalvedhe, And Tim Thomas, Motorola Inc," LTE ADVANCED", IEEE Wireless Communications (Volume: 17, Issue: 3, June 2010), ISSN 1536-1284.
- [3]. Puttonen, J.; Henttonen, T.; Kolehmainen, N.; Aschan, K.; Moisio, M.; Kela, P.; , "Voice-Over-IP Performance in UTRA Long Term Evolution Downlink," IEEE Vehicular Technology Conference, vol., no., pp.2502-2506, 11-14 May 2008.
- [4]. 3GPP Technical Specification 23.228, "IP Multimedia Subsystem (IMS); Stage 2 (Release 11) http://www.3gpp.org, 2012.
- [5]. Siomina, I .Wansted t, S "The impact of QoS support on the end user satisfaction in LTE networks with mixed traffic," IEEE 19th International Symposium on Personal, Indoor and Mobile Radio Communications, pp.1-5, 15-18 Sept. 2008