

AUTOMATED RAB(Radio Access Barrier) SERVICES HSDPA DATA TRANSFER 16 QAM(CPC)

Afreen Banu¹, Dr. Yamuna Devi C.R²

¹M.Tech Digital Communication and Networking, Dr. Ambedkar Institute of Technology, Bangalore, Karnataka, India

²prof. HOD, Dept. of Tele-communication Engineering, Dr. Ambedkar Institute of Technology, Bangalore, Karnataka, India

Abstract -The principle aim of this paper is to check if High-speed downlink Packet Access (HSDPA) Quadrature Amplitude Modulation (16-QAM), works properly with Continious Packet Connectivity (CPC) feature. During the test there will be one user transferring data in, user establishment of HSDPA connection File Transfer Protocol (FTP), validation of 16-QAM modulation is based on the user throughput (t-put), Emil/Megamon logs (layer 3), validation of Channel Quality Indicator (CQI) value and Physical Downlink Shared Channel (PDSCH) codes. This testcase will be tested using Robot Framework is an open source generic test automation framework. The framework is written using the Python programming language. It utilizes the keyword-driven testing approach. Finally the logs are obtained for each testcase where we can analysis the each step and can be verified.

Key Words -BTS- Base Transceiver Station, CPC- Continious Packet Connectivity, CQI - Channel Quality Indicator, OMS- Optical Management System, PDSCH- Physical Downlink Shared Channel, t-put- throughput, UC-Ultra caller.

1. INTRODUCTION

HSDPA has been designed to support peak data rates of 12. Mbps in one cell. The introduction of High Speed- Downlink Shared Channel (HS-DSCH), the new transport channel and the two control channels for the uplink and downlink used by several users simultaneously gave the major enhancement to the UMTS Terrestrial Radio Access Network (UTRAN).

The following features enable the high t-put capabilities of HSDPA:

- HSDPA introduces an Adaptive Modulation and Coding (AMC) scheme, whereby modulation method and coding rate are selected based on information about channel conditions provided by the terminal and the Node-B. In the downlink HSDPA supports 16QAM as a higher-order modulation method for data transmission under good channel conditions, in addition to Quadrature Phase Shift Keying (QPSK) which is already specified for use in Wideband Code division Multiple Access (WCDMA).
- HSDPA uses a Hybrid Automatic Repeat request (HARQ) protocol to handle re-transmissions and to guarantee error-free data transmission. HARQ is a key element of the new Media Access Control (MAC) entity denoted as MACHs, which is located both in the Node-B and in the User Equipment (UE); see Figure 1

- The HS-DSCH resources (such as time slots and codes) is allocated in a algorithm- fast Packet Scheduling in which timeslots and codes are assigned to the different users, is also implemented as part of Node-B functionality.

The HSDPA standards go further than the HS-DSCH and have the two following additional transport and physical layer channels. The High-Speed Shared Control Channel (HS-SCCH) is a downlink channel which is used to provide control information associated with the High Speed-Physical Downlink Shared Channel (HS-PDSCH)

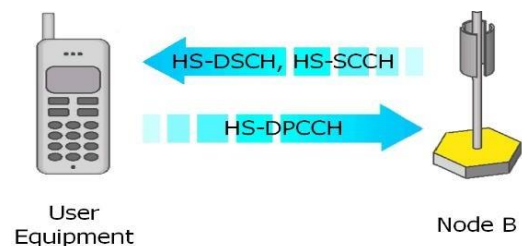


Fig-1: New transport and physical channels introduced by HSDPA

It includes information such as the identity of the mobile terminal for which the next HSDPA sub-frame is intended, the type of modulation scheme that has to be used during decoding the HS-DSCH sub-frames and the information about the channel code.

The High-Speed Dedicated Physical Control Channel (HS-DPCCH) is an uplink control channel which is used to convey channel quality information (carried by CQI - Channel Quality Indicator - bits) as well as ACK/NACK messages related to the HARQ operation in the Node-B.

1.1 CHANNEL QUALITY INDICATOR AND MODULATION SCHEME

CQI -CQI stands for Channel Quality Indicator. As the name implies, it is an indicator carrying the information on how good/bad the communication channel quality is. This CQI is for HSDPA. CQI is the information that UE sends to the network and practically it implies the following two:

- Current Communication Channel Quality is this-and-that..
- UE wants to get the data with this-and-that transport block size, which in turn can be directly converted into throughput

In HSDPA, the CQI value ranges from 0 ~ 30. 30 indicates the best channel quality and 0,1 indicates the poorest

channel quality. Depending which value UE reports, network transmit data with different transport block size. If network gets high CQI value from UE, it transmit the data with larger transport block size and vice versa.

Modulation Scheme - MCS (Modulation Coding Scheme) is related to Modulation Order (Modulation Depth, e.g, QPSK, 16 QAM, 64 QAM, 256 QAM). This modulation order is defined as a Parameter called Qm in 3GPP and the relationship between MCS value and Qm is defined in a little bit differently for PDSCH.

Modulation defines how many bits can be carried by a single RE, for 16 QAM there are 4-bits can be transmitted per RE (Resource element). This cell defines the channel code used for the HS-PDSCH by the code offset value.

Table-1: Modulation Order

| Qm | Modulation Method |
|----|-------------------|
| 2 | QPSK |
| 4 | 16 QAM |
| 6 | 64 QAM |
| 8 | 256 QAM |

In the case of multiple codes for HSPDA, this defines the first channel code in the series. This cell is coupled with the HS-PDSCH Number of Codes cell. The sum of the values for both cells cannot exceed 16. In addition, the selected channel code must be orthogonal with the codes for all other physical channels. If the parameters for either of these conditions are exceeded, a code domain conflict occurs and the Apply function will not work. To perform this we will use Robot Framework.

1.2 ROBOT FRAMEWORK

Robot Framework is operating system and application independent. The core framework is implemented using Python. Automation software testing is a necessary and important phase in the current software development process. Testing activities are to discover errors and defects of applications in an early phase to produce reliable products to be released in production. To accomplish this, the quality assurance team must perform proper manual or automation testing. Figure 2 illustrates the high-level architecture of Robot Framework. It receives the test data and uses test libraries to communicate with the system that is being tested.

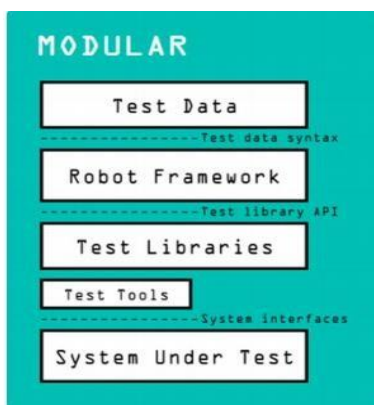


Fig-2: Modular Framework.

The test data is in simple, easy-to-edit tabular format. Once Robot Framework is started, it processes the data, executes test cases and generates logs and reports. The core framework does not know anything about the target under test, and the interaction with it is handled by libraries. Libraries can either use application interfaces directly or use lower level test tools as drivers.

1.3 OBJECTIVE

- The main objective in using the robot framework is to automate the operation and maintenance test scenarios, testcases as part of continuous integration testing in WCDMA Integration & Verification area.
- Also, end to end 3G data calls are verified with the desired throughput using the framework script
- Log analysis is done thoroughly within the framework script at the end of each testcase.
- To obtain the Minimum t-put of approx., 9Mbps, Avarage CQI (channel Quality indicator)
- ,Performing the 16 QAM Modulation of 100 threshold.
- Setting No. of PDSCH Codes =15 which is >=95% of threshold (In more than 95% of all subframes PDSCH codes should be equal to 15)
- To obtained the graph in Ultracaller tool, and obtaining the L3 messages from the testcase and capturing those messages from megamon server.
- To obtained the logs for the HSDPA 16QAM CPC, L3 Messages and throughput

2. LITERATURE REVIEW

Mubarak Elamin Elmubarak Daleel, - In this study they focused on to **“Resources Management of Mobile Network IEEE 802.16e WiMAX”** This paper IEEE802.16e studies that the system according to the continuous modeling case and a model of the cell allows decomposition of the cell according to the principle of the AMC adoptive modulation and coding technique. Multimedia services require high transfer rates and quality services. users needs to access value added multimedia services in their home environment regardless of how they access the system because it is no longer sufficient to provide access to the network.

Dhruv Singh Thakur - In this paper they focused on- **“Evolution of High Speed Download Packet Access (HSDPA) Networks”** The study work includes the HSDPA (High Speed Downlink Packet Access) is data communication which is the extention of 3GPP rel5. This will supports 14 Mbps, that is sufficient for high end data transfers and Mobile TV streaming. The Hardware and protocol, that is used in the HSDPA is different than in GPS or GPRS so that the device must be able to support the technology. This also states that HSDPA is based on common channel sharing transmission and it includes main features like multi-code transmission, higher order modulation, short transmission time (TTI), fast link adaptation and s

cheduling with the fast Hybrid Automatic Repeat Request (HARQ). It also includes a review on evolution from various variants of the HSDPA system with their functionality.

Kamna Singh et.al. - Studied on “**Optimistic Approach of High Speed Downlink Packet Access**”. The study work includes that from the evolution of WCDMA there is more benefit to the Wireless Broadband access to the Internet, intranet and corporate LAN. It states that it is just the upgrade of GSM which works on 1.9GHz. This paper also represents how the evolution of HSDPA gradually become the first step towards the WCDMA. Keyword: Fast link Adaption, Fast Hybrid ARQ.

Ana Rita Luzio - study about “**Performance Gain Evaluation from High Speed Packet Access Evolution (HSPA+)**” Here we study on the HSPA+ technology, has the impact on the today’s mobile communication networks. To this end we studied how to use the features and how they can increase the data rate transfer per user on the features like MIMO (Multiple Input Multiple Output) and HOM (Higher Order Modulation). The obtained results shows that by varying the configuration of modulation type and antennas, the data transmission can be increased. And by using the 4x4 MIMO and 64-QAM (Quadrature Amplitude Modulation) modulation, we can obtained the maximum theoretical order in both Downlink (DL) and Uplink (UL) respectively. These results are obtained by implementing the direct application or manipulation of existing models and integrated in a simulator. **Bazil Taha-Ahmed** Studied on “UMTS-HSDPA in High Altitude Platforms (HAPs) communications with finite transmitted power and unequal cell’s load” This paper states, the cell where the network under study is assumed to have 61 cells will undergo different scenarios and two directions that is, 0° and 30° from which we study the performance of HAPs (High Altitude Platforms) UMTS HSDPA (High Speed Downlink Packet Access). From this they concluded that the effective range is lower in the urban zone users than in the rural zone users. It also shows that, in the rural zones, when the cells are not fully loaded, HSDPA can support 16 QAM with.

3. PROPOSED SYSTEM

There is a need to perform a thorough test of network elements within the UTRAN prior to releasing them for deployment. Verifying the correct implementation of user plane and control plane procedures is only one part of the testing issues that need to be addressed. Since user data is being exchanged at high throughputs between the Node-B and the Radio Network Controller (RNC), there is also a need to carry out performance testing of Node-Bs and RNCs.

3.1 PRE- SET UP

Steps to be performed:

Step 1: Download the build from the server through the following link

<https://wft.int.net.nokia.com/WCDMA/builds/WBTS000000431700> Login in with username and password. After login in to the wft tool, from there you can download the required build and the SEM(Site Element Manager) version

Step 2: Download the version from sub build download, For linux machine download .bin file for windows machine download .exe file. After downloading the required files and version

Step3: Install the SEM version by the command

`./BTS SiteEM-WBTSFP21C-0_081_0_X64.bin.`

To Upgrade the Build, Login to the BTS site Manager with the proper credentials.

Start→Nokia→BTS Site→BTS Site Manager

Step 4: Update the software, software→update SW to BTS Site→Browse the File from the path→select Update. Once the site is Updated to the required Build And commissioned is done, the site is Up ie., Onair the Site is ready to execute the Test Case (TC).

Step 5: Disconnect the BTS sitemanager →open the terminal →trigger the `hsdpa16qam.sh` script

`hsdpa16qam.sh`- This contains 3 scripts are as follows:

- 1.CBR_RRM_RAB_services_HSDPA_16QAM_CPC_data Transfer_test_CIT2
- 2.CBR_RRM_RAB_services_HSDPA_dataTransfer_test_CIT2_16qam_hsdpa_UC
- 3.CBR_RRM_RAB_services_HSDPA_dataTransfer_test_CIT2_test_hsdpa

After the TC is executed obtain the logs from the path `home/ute/btsauto/AutoTest/----`

Step 6 : Analyse the logs

3.2 PRE- CONDITIONS TO BE PERFORMED

1. Check if HSDPA parameters are set properly in the BTS commissioning file
2. BTS should be on air with all cells up and running
3. UES are latched to the working cell, check if proxy is running in ultra caller
4. DSP IP is properly configured in the `env_config_1.yaml` file and in the resource file
5. Correct board and ports are enable in the `config.lua` file
- 6.Megamon server machine ip details and credentials are properly set in the resource files (`wbtsemil.robot` and `HSDPA_and_HSUPA_Trace_Run.robot`)
7. Initiating emil log collection on the megamon server and checking the ip details on the megamon application which has connection to RNC-25 as part of L3 log analysis
8. Check if PDSCH codes are set to 15 in the OMS for the WBTS working cell.

BLOCK DIAGRAM

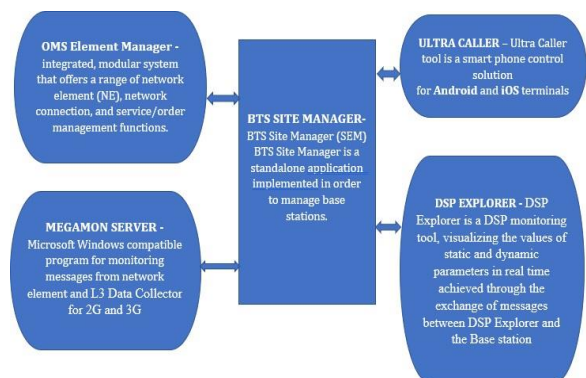


Fig-3:Block Diagram

OMS Element Manager is a web-based user interface (GUI) that allows you to manage the topology of objects connected to OMS and use various applications.

OMS is an integrated, modular system that offers a range of network element (NE), network connection, and service/order management functions. Here we will enable

all the features which are responsible for the HSDPA 16-QAM, once it is enabled ULTRA CALLER comes in to picture where, It uses USB proxy is a physical computer to control Android devices through USB connection. Separate SW is needed to handle traffic between devices and the Ultra Caller server. Preferred operating system for USB proxy is Linux, that is interconnected to BTS. ULTRA CALLER helps to download the WCDMA_50mb_Download file from the FTP server and the it calculates the Average Byte Transferred and obtained the T-put.

The messages that is obtained between the UE and the RNC are captured by using the Emil and Megamon server. MegaMon tool is a Microsoft Windows compatible program for monitoring messages from DX 200 is a digital switching platform currently developed by Nokia Networks and ADA3/ADA4 network element. Communication is done through Tcp/ip (Transmission Control Protocol/ Internet protocol).

The logs that generated will be converted to CSV files .This will be taken for analysis and that is grep from here and stored in the output.html. HSDPA_xxx_xx.csv contains all the data which is further extracted to validate the CQI, PDSCH and 16-QAM Modulation. DSP Explorer collects the TTI traces

3.3 IMPLEMENTATION

HSDPA testcase contains the following scripts

1.CBR_RRM_RAB_services_HSDPA_16QAM_CPC_dataTransfer_test_CIT2

This script will enable the OMS parameters – Fractional Downlink Physical Channel (FDPCH) and CPC, By Login in to the OMS with proper credentials and enable the below HSDPA parameters :

- HSDPA capability under general
- HSDPA enabled—enabled
- HSDPA 64 QAM allowed --disabled
- HSDPA 64 User Enabled disabled under Admission control
- PDSCH should have 15 codes true under power control

Once the OMS parameters are enabled it executes the next script.

2.CBR_RRM_RAB_services_HSDPA_dataTransfer_test_CIT2_16qam_hsdpa_UC

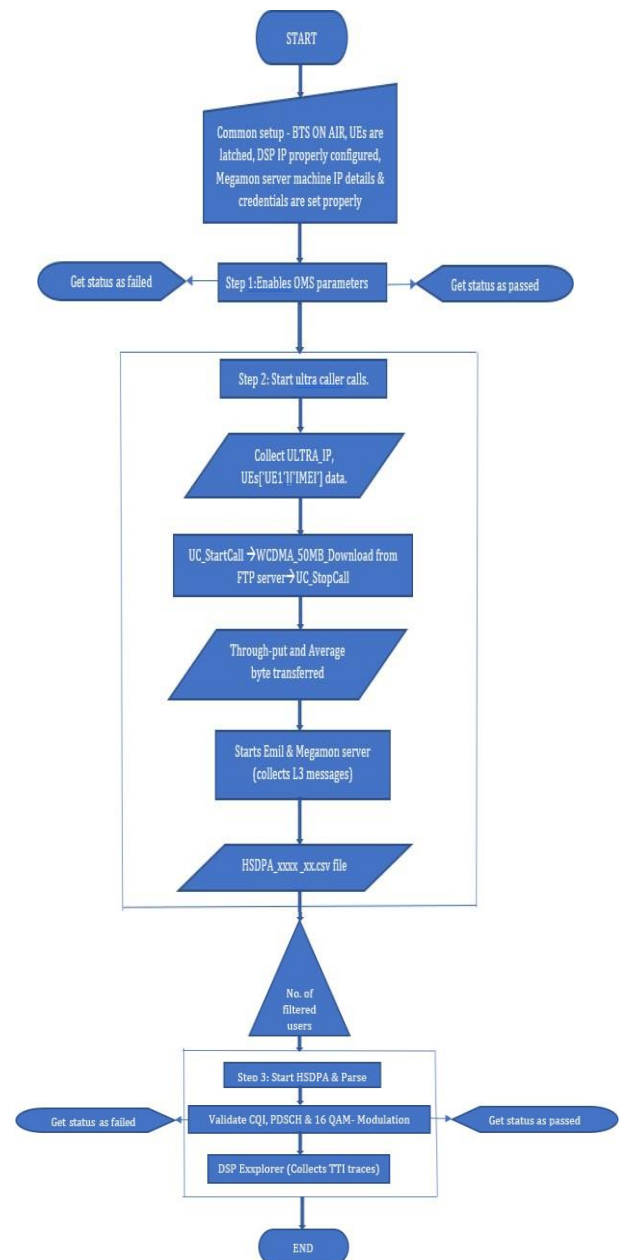
This will makes to Login to the UC with proper credentials. Here will download the WCDMA_50MB_Download from (File Transfer Protocol) FTP server and achieved the average throughput of approx., 11Mbps, transferred bytes, and the graph is obtained for it . And then it Start Emil And Check,which means it collects the L3 messages from Megamon server. Thirdly, It starts the HSDPA and Parse

3.CBR_RRM_RAB_services_HSDPA_dataTransfer_test_CIT2_test_hsdpa

DSP explorer for verifying the HSDPA mac hs TTI trace should be up and running, collects the TTI traces. Here we will validate CQI, PDSCH and 16-QAM Modulation based on the input validation and number of filtered users.

- Avarage CQI (channel Quality indicator) of 30
- Setting No. of PDSCH Codes =15 which is >=95% of threshold (In more than 95% of all subframes PDSCH codes should be equal to 15)
- Performing the 16 QAM Modulation of 100 threshold.

3.4 FLOW CHART:



4. SOFTWARE REQUIREMENTS:

4.1 BTS SITE MANAGER:

BTS Site Manager (SEM) BTS Site Manager is a standalone application designed and BTS Site Manager can be used in any workstation that is capable to run the Java runtime environment system compliant operating (e.g. Windows, HP-UX), e.g. in PC or laptop, and has TCP/IP and FTP socket connections. BTS Site Manager thus works on a different processing environment than BTS SW.

It uses the Compatibility Launcher of the Element Manager to ensure the most correct interface version and the best compatibility between the BTS Site Manager SW and the BTS SW. implemented in order to manage base stations.

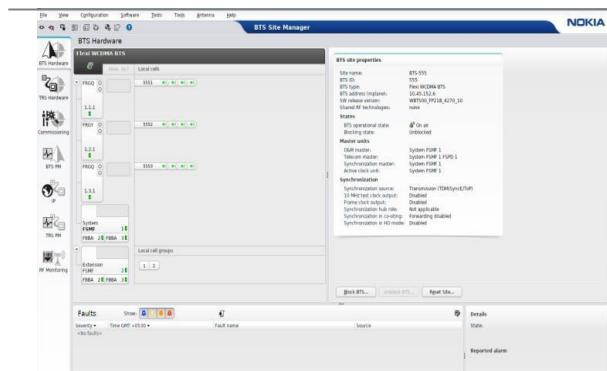


Fig 4. BTS site Manager

4.2 ULTRACALLER TOOL

UltraCaller tool is a smart phone control solution for **Android** and **iOS** terminals. UltraCaller is a Web application that is installed on a remote or local server and delivered over the Intranet through a browser interface. Preferred browsers are Firefox and Chrome.

USB proxy:

USB proxy is a physical computer to control Android devices through USB connection. Separate SW is needed to handle traffic between devices and the UltraCaller server. Preferred operating system for USB proxy is Linux. USB Proxy controls connected Android devices via Android Debug Bridge (ADB). Proxy supervises connected UE's and creates socket connection to devices that are visible via ADB. Data between UE and proxy is transferred through socket connection. It is possible to send commands to Proxy from Webserver and from devices. There is a separate tab for proxies in UltraCaller GUI server settings where user can see own proxies, their statuses and also control them.

Advantages of USB connection:

- Commands can be sent to UE when mobile data is not available.
- Rebooting of UE is possible without rooting the UE.
- Airplane mode and mobile data can be toggled without predefined time.

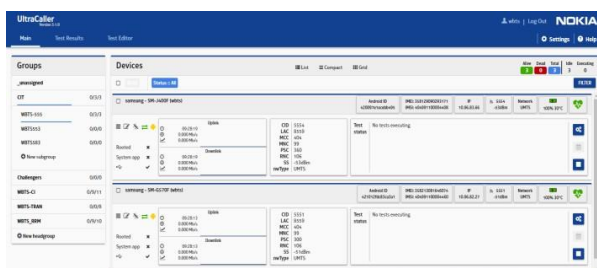


Fig 4. Ultra Caller

4.3 OMS Element Manager:

OMS Element Manager is a web-based user interface (GUI) that allows you to manage the topology of objects connected to OMS and use various applications.

OMS is an integrated, modular system that offers a range of network element (NE), network connection, and service/order management functions. It links the management of traditional network equipment with next-generation technology and offers distribution options that can grow with network expansion.

OMS offers the benefits of fast service activation, state-of-the-art provisioning, reduced operating and equipment costs, accurate record keeping, fault management, and fast

problem resolution. In addition, the management system can discover much of the information about NEs and network connections, instead of requiring that information to be entered manually, which minimizes network operator effort and reduces errors. About the software OMS is run through an Internet browser-based Graphical User Interface (GUI)—it is a web application that runs through a browser.

The OMS Element Manager allows you to perform the following operations:

- Browse topology of managed network elements.
- Request wmts reset.
- Lock or unlock wcel under wmts.
- View main parameters of network element and objects under it
- View bts connection resources for wmts (rnc)
- Network resiliency operations (available only if feature ran2512 (ipa rnc) or ran3005 (mcrnc) is activated) : rnc service activation and deactivation, rnc service force activation, rnc, loading and unloading RNC Service for Configuration and Deleting RNC Service Backup Configuration

4.4 MEGAMON SERVER:

L3 Data Collector for 2G and 3G (MegaMon).

MegaMon tool is a Microsoft Windows compatible program for monitoring messages from DX 200 and ADA3/ADA4 network element. Communication is done through Tcp/ip.

setup → connection →

The logs that generated will be converted to CSV files that is stored in the \Windows(c)\Megamon logs \ output . csv\ This will be taken for analysis and that is grep from here and stored in the output.html.

MegaMon is used with the following technologies:

- 3G/WCDMA
- Radio Network Controller (IPA-RNC)
- Multicontroller RNC (mcRNC)

MegaMon server IP addresses needs to be configured into the same subnet as the network element computer units. This needs to be considered when IP planning. MegaMon IP switch will now distribute the message monitoring stream between those two Local Area Network (LAN) interfaces. Create control connection from MegaMon to Information Processing Architecture (IPA-RNC): Control connection between MegaMon and IPA-RNC is configured in the Control Connection window that is found on Setup ► Connections menu.

4.5 DSP EXPLORER:

DSP Explorer is a DSP monitoring tool, visualizing the values of static and dynamic parameters in real time achieved through the exchange of messages between DSP Explorer and the Base station.

DSP Explorer runs on Windows PC that is physically connected with the Base station through Ethernet, using TCP/IP.

5. TEST RESULTS AND LOGS:

This is a log.html page which is automatically created after test runs. This page summarizes different test suites and their runs with pybot command that was triggered. These reports are interactive and can be drilled down to have detailed analysis of how the steps in test scripts went.

1. CBR_RRM_RAB_services_HSDPA_16QAM_CPC_dataTr ansfer_test_CIT2

CBR RRM RAB services HSDPA 16QAM CPC dataTransfer test Test Log

Generated 20210603 16:48:23 GMT+05:30 119 days 5 hours ago

Test Statistics

| Total Statistics | Total | Pass | Fail | Elapsed | Pass / Fail |
|------------------|-------|------|------|----------|-------------|
| Critical Tests | 1 | 1 | 0 | 00:03:16 | |
| All Tests | 1 | 1 | 0 | 00:03:16 | |

| Statistics by Tag | Total | Pass | Fail | Elapsed | Pass / Fail |
|--|-------|------|------|----------|-------------|
| AUTHOR:joanna.galotos@nokia.com | 1 | 1 | 0 | 00:03:16 | |
| CA:BS | 1 | 1 | 0 | 00:03:16 | |
| Online workspace version = robot_wbts_32.8 | 1 | 1 | 0 | 00:03:16 | |
| OWNER:marie.aguilar@nokia.com | 1 | 1 | 0 | 00:03:16 | |
| PHASE-CBR | 1 | 1 | 0 | 00:03:16 | |
| REL2 | 1 | 1 | 0 | 00:03:16 | |
| REL3 | 1 | 1 | 0 | 00:03:16 | |

| Statistics by Suite | Total | Pass | Fail | Elapsed | Pass / Fail |
|--|-------|------|------|----------|-------------|
| CBR RRM RAB services HSDPA 16QAM CPC dataTransfer test | 1 | 1 | 0 | 00:03:23 | |

30 which is >=27 of threshold (Average CQI of all subframes in TTI trace) and 16 QAM Modulation is 100 which is >=95% of threshold (In more than 95% of all subframes modulation should be 16 QAM) and No. of PDSCH Codes =15 which is >=95% of threshold (In more than 95% of all subframes PDSCH codes is equal to 15)

L3 messages are checked as in the testcase and Radio Bearer Reconfiguration (RRC), (Dtx-drx-Timing info) and NBAP Radio link Setup Request/Radio Link Reconfiguration Prepare (continuous packet connectivity) — messages have been existed

Robot Framework thus has a natural flow for automation and use keywords makes it easy for a non-technical person to understand the process and explore more. Everything including testing, report generation, log file generation takes place automatically thus saving time and effort in continuous integration systems(CIT). In current development process Robot Frame work has multitudinous benefits that is highly eligible automation tool

2. CBR_RRM_RAB_services_HSDPA_dataTransfer_test_CIT2_16qam_hsdpa_UC

dataTransfer test CIT1 16qam hsdpa UC Test Log

Generated 20210603 19:38:02 GMT+05:30 119 days 5 hours ago

Test Statistics

| Total Statistics | Total | Pass | Fail | Elapsed | Pass / Fail |
|------------------|-------|------|------|----------|-------------|
| Critical Tests | 1 | 1 | 0 | 00:08:14 | |
| All Tests | 1 | 1 | 0 | 00:08:14 | |

| Statistics by Tag | Total | Pass | Fail | Elapsed | Pass / Fail |
|--|-------|------|------|----------|-------------|
| AUTHOR:joanna.galotos@nokia.com | 1 | 1 | 0 | 00:08:14 | |
| CA:BS | 1 | 1 | 0 | 00:08:14 | |
| Online workspace version = robot_wbts_32.8 | 1 | 1 | 0 | 00:08:14 | |
| OWNER:marie.aguilar@nokia.com | 1 | 1 | 0 | 00:08:14 | |
| PHASE-CBR | 1 | 1 | 0 | 00:08:14 | |
| REL2 | 1 | 1 | 0 | 00:08:14 | |
| REL3 | 1 | 1 | 0 | 00:08:14 | |

| Statistics by Suite | Total | Pass | Fail | Elapsed | Pass / Fail |
|---------------------------------------|-------|------|------|----------|-------------|
| dataTransfer test CIT1 16qam hsdpa UC | 1 | 1 | 0 | 00:08:16 | |

FUTURE SCOPE

Further, a long term evolution effort was progress which is focused on ensuring that UMTS remains a highly-competitive packet-based radio-access technology through 2010 and beyond benefits. This project is called the LTE (Long Term Evolution) initiative. It aims to achieve data rates of up 200 Mbps for downlink and 100 Mbps for uplink using OFDMA modulation.

The Fifth Generation (5G)- Real Wireless World System 5G Technology stands for 5th Generation Mobile technology. 5G mobile technology has changed the means to use cell phones within very high bandwidth. 5th wireless mobile multimedia internet networks can be completed wireless communication without limitation, which bring us perfect real world wireless – World Wide Wireless Web (WWWW).

Further next to 5G, 6G will integrate all wireless mobile networks with satellites to get global coverage. It is assumed that 6G will proffer the speed of 1GB data transfer

3. CBR_RRM_RAB_services_HSDPA_dataTransfer_test_CIT2_test_hsdpa

CBR RRM RAB services HSDPA dataTransfer test CIT2 test hsdpa Test Log

Generated 20210420 23:57:09 GMT+05:30 153 days 22 hours ago

Test Statistics

| Total Statistics | Total | Pass | Fail | Elapsed | Pass / Fail |
|------------------|-------|------|------|----------|-------------|
| Critical Tests | 1 | 1 | 0 | 00:01:35 | |
| All Tests | 1 | 1 | 0 | 00:01:35 | |

| Statistics by Tag | Total | Pass | Fail | Elapsed | Pass / Fail |
|---------------------------------|-------|------|------|----------|-------------|
| AUTHOR:joanna.galotos@nokia.com | 1 | 1 | 0 | 00:01:35 | |
| CA:BS | 1 | 1 | 0 | 00:01:35 | |
| OWNER:marie.aguilar@nokia.com | 1 | 1 | 0 | 00:01:35 | |
| PHASE-CBR | 1 | 1 | 0 | 00:01:35 | |
| REL2 | 1 | 1 | 0 | 00:01:35 | |
| REL3 | 1 | 1 | 0 | 00:01:35 | |

| Statistics by Suite | Total | Pass | Fail | Elapsed | Pass / Fail |
|--|-------|------|------|----------|-------------|
| CBR RRM RAB services HSDPA dataTransfer test CIT2 test hsdpa | 1 | 1 | 0 | 00:01:35 | |

REFERENCES

- [1] Mubarak Elamin Elmubarak Daleel and Marwa Eltigani Abubakar Ali, "Resources Management of Mobile Network IEEE 802.16e WiMAX", (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 8, No. 4, 2017
- [2] Dhruv Singh Thakur , Krishnakant Nayak and Rohini Piplewar, " Evolution of High Speed Download Packet Access (HSDPA)" 2183 International Journal of Engineering Research & Technology (IJERT), Vol. 2 Issue 11, November – 2013, IJERT ISSN: 2278-0181
- [3] Ana Rita Luzio, Joao Venturinha Gomes, and Pedro Vieira, "Performance Gain evaluation from High speed Packet Access Evolution (HSPA+), Conference on Electronics, Telecommunication and Computers – CETC 2013, Procedia Technology 17 (2014) 720 –
- [4] Bazil Taha-Ahmed , Miguel Calvo-Ramón, "UMTS-HSDPA in High Altitude Platforms (HAPs)
- [5] Communications with finite transmitted power and unequal cell's load", www.elsevier.com/locate/comcom ,2009 Vol. 32; Iss. 5

6. CONCLUSION:

HSDPA 16QAM CPC test got passed and the following conditions are fulfilled and none error messages in the test log report by considering all the cells in which calls were made. Minimum t-put is approximately- 9Mbps , measured in Net Per Sec, Average CQI (channel Quality indicator) is

-
- [6] Kamna Singh, "Optimistic Approach of High Speed Downlink Packet Access" ,(IJCSIT) International Journal of Computer Science and information Technologies, Vol.8(3), 2017, 401-406.
- [7] Chung-An Shen, Chia-Po Yu and Chien-Hao Huang, "Algorithm and Architecture of Configurable Joint Detection and Decoding for MIMO Wireless Communications With Convolutional Codes", April 2015, IEEE Transactions on Very Large Scale Integration (VLSI) Systems 24(2):1-1, DOI:10.1109/TVLSI.2015.2419234
- [8] Mandara Nagendra¹ , C N Chinnaswamy² , Dr. T H Sreenivas³, "Robot Framework: A boon for Automation",ISSN:2455-2631, November 2018, IJSDR , Volume 3, Issue 11
- [9] Yanapat Chuchuen and Kritwara Rattanaopas, "Implementation of Container Based Parallel System for Automation Software Testing", International ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (ECTI-NCON)