


Significance of 5G Network Validation and Apple iPhone 12 Launch – A Review

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Abstract— Apple iPhone 12 was launched on October 13, 2020 and 5G market share and its footprint worldwide is expected to grow to a greater extent. Increasing 5G traffic definitely calls for an outage free network making quality assurance and validation as the key aspects for customer satisfaction and competitive advantage for the wireless network carriers worldwide. This paper discusses the importance of 5G (Standalone and Non-Standalone) Core, Radio Access network and Inter-Operability quality assurance validation for any multivendor operator environment.

Index Terms—5G, mmWave, Apple, iPhone 12

I. INTRODUCTION

Many wireless telecom carriers around the world have upgraded their network to support 5G Non-Standalone (NSA) and Standalone (SA) technologies in 2019 and 2020 respectively. A handful of carriers are still working on their network upgrades and expected to soon have the network ready by Q1 of 2021. iPhone 12 which was launched today supports the 5G technology across a variety of cellular network bands for the low and mid-band type of 5G connectivity while mmWave connections are supported on the most popular n260 and n261 bands for Models A2172 and A2176 which would be primarily sold in the United States. Wireless Operators who support 5G would have the competitive advantage for iPhone 12 when compared to the competitors who are in the process of upgrading their networks. Apple's iPhone 12 is expected to increase the 5G footprint and market share worldwide and 5G network quality assurance and validation becomes a key aspect in customer satisfaction.

II. 5G NETWORK VALIDATION

The 5G network comprises of three main components – Core Network, Radio Access Network and User equipment. Third generation partnership program (3GPP) defined 5G Standalone (SA) network functions such as Anchor and Mobility Function (AMF), User Data Management (UDM) etc. and 5G Non standalone (NSA) network functions such as Mobility Management Entity (MME) and Home Subscriber Server (HSS) fall under the category of Core network elements. Radio Base Station, Cell Sites fall under the

category of Radio Access Networks which are also defined by 3GPP. Smartphones, Smartwatches, Tablets etc. fall under the category of User Equipment (UE). In order to achieve a defect and outage free network, a good Acceptance Test Plan (ATP) comprising of wide range of test scenarios must be prepared and a through validation and testing should be performed.

A. Core Network Validation

5G Core Network Validation should ensure that the network functions are compliant to 3GPP protocol and Interface specifications. The Acceptance Test Plan (ATP) should comprise of end to end call flow covering both Standard and Non-Standard 5G nodes. Also, the ATP must comprise of Regression, Feature, Load and Stress related test case. All defects must be documented with the Core network vendors and an appropriate software correction must be re-tested and deployed. All Key Performance Indicators (KPI) must be clearly validated and documented.

B. Radio Access Network Validation

Radio Access Network Validation (RAN) should comprise all the above-mentioned aspects on its Acceptance Test Plan (ATP) and thoroughly regressed and tested for a defect free RAN Software. Along with that, RAN Validation should also include test cases for Inter Base Station Handover, Intra Access Mobility Function and other types of voice and data call handover scenarios. A thorough load and performance testing is must also be performed and the maximum allowed transactions per second (TPS) must be documented. Throughput data testing and validation is the most important validation when it comes to 5G and mmWave testing and quality Assurance. The Radio Access Network (RAN) nodes must be able to deliver the agreed data peak throughput on Low, Mid and mmWave cellular bands. mmWave can support data speeds in Giga bits Per Second (Gbps) while Low and Mid Bands can support practical speeds in Megabits per second (Mbps).

C. Inter-Operability Validation

The Acceptance Test Plan (ATP) should cover the

interworking of Radio Access Network, Core Network and the User Equipment (UE) and confirm these devices are able to Inter Operate Successfully. Additionally, all variants of the latest Smartphones supporting 5G Such as Samsung Galaxy, OnePlus and iPhones (12 – Mini, Pro, Max etc.) must be verified for defects. Core and Radio Access Network nodes could have been most probably procured from different networking vendors and the Interoperability must be thoroughly verified and all issues must be addressed so that the network can be error free.

III. CONCLUSION

Wireless technologies are being updated frequently and the operator must possess an error free network to avoid production outages to achieve top customer satisfaction. Also, the operator's network coverage must be as accurate and larger as possible. A thorough validation and quality assurance life cycle execution is required before every product release and Apple iPhone 12 is no different. Apple iPhone 12 has been launched and 5G footprint is expected to grow at a rapid pace in the near future worldwide. Wireless Carriers must use the time and perform a thorough network validation and ensure quality assurance for 5G if they haven't done so far.

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