

Security issues in 5G device to device communication

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Abstract

5G is a promising technology that will support high connectivity and device to device communication. It also promises to improve the existing technologies and will support them. Existing LTE-A utilize centralized communication scheme where all the authentication mechanisms need to go through the base station. This centralized authentication mechanism may generate authentication and key management overhead as well as computational complexity, thus not in line with the 5G requirements. On the other hand, distributed communication scheme lacks hop by hop authentication, thus, it is challenging to share the initial security credentials within the relay stations at multi-hop.

Secondly, distributed communication scheme required decode and forward relays, a partial intelligent relays that can act as a semi base stations. Such relays are known as non-transparent relays. However, inclusion of such intelligent relays can leads towards a ROGUE RELAY STATION (RRS) attacks, which consequently generate Replay attacks, DoS and the MITM (where mutual authentication is absent). RRS can generate interleaving attack even in the presence of mutual authentication.

Index Terms

Distributed Security Issues; MAC layer issues; Security; Interleaving Attacks; 5G.

1. Introduction

5G appears to be a promising technology in terms of high speed, low latency and ubiquitous connectivity. There are almost 5 billion devices connected and due to IoT storm the number of devices can go up to 25 billion by the year 2020. It will make virtual reality possible by providing instant downloading into 10Gbps and lighting fast response. 5G will provide extremely high throughput with low latency and billions of devices support. It is claimed by Samsung has achieved about 7.5Gbps at static and 1.2Gb/sec in car at 100Km/h while it believes to take car to 50gb/sec, Nokia claims up to 10 Gbps and University of survey claims about 1Tbps. In October 2015 Huawei and Japan NTT managed 3.6 Gbps using 6GHZ band. Huawei claims to make 5G almost 100 times faster than 4G and will support technologies like 4G, LTE, LTE-A, TD-LTE, AVGP, WiMAX TD-LTE-A and LTE with VoLTE and WiMAX [1], [2]. It is pertinent that almost 1.7 trillion Dollars will be invested by operator in 4G by 2020.

Network Function Virtualization (NFV), Software defined Networks (SDN) and Heterogeneous Network (HetNets) are already in deployment stages. 4G users consume double or three time the amount of data other than non 4G users due to increase in video stream. Machine-to-Machine communication is also predicted to be 250 million by 2016 while it is predicted to 1 billion and 2 billion by 2020.

5G will provide an opportunity to converge mobile broadband and broadcast services. It is also stated that in 2013 mobile data traffic increased about 81% and expected to increase more than eleven (11) folds by 2018. 5G is challenged to converge both point to point or unicast communication such as mobile TV and point to multi point such as traditional TV. 5G aims to provide a single UAI to meet diverse requirements in terms of application of QoE and Adoption. 5G will allow tactile internet that means that sense of touch along with hearing and seeing capabilities can be achieved like touching and trying clothes before buying, doctor doing operation from America in remote area of Pakistan without any difficulty. Also making possible the augmented reality or virtual reality possible [3].

5G will allow combining both cellular and broadcast industry. In 4G LTE assumes that everything will be packet based or will OFDM, 8011.16m has also similar target as LTE, till 2014 there are 350 commercial vendor of LTE that have reached to 450 by 2015. It will provide seamless connectivity to all devices that are from sensors and actuator to user equipment's. 5G will allow users to connect simultaneously to multiple networks and technologies and there will be multiple concurrent paths for data transfer. 5G will have 3GPP LTE and HSPA and WI-FI as its component [4], [5].

1.1 Definition

5G is being developed by European standard METIS and there is no exact definition of 5G but there are two views given

- ❖ 5G is a combination or amalgamation of all previous Generations that are 2G, 3G, 4G and Wi-Fi with higher capabilities in terms of