**LM 8. Cellular Network Security**

1. **LM8. Student Learning Outcomes**

After completing this module, a student will be able to:

* Describe the security vulnerabilities present in 1G cellular network
* Describe the security architecture of GSM (core network and access network)
* Describe the existing issues in GSM security
* Discuss the security improvement of 3G and 4G LTE network comparing to GSM
* Describe the security features of UMTS (3G) and LTE (4G)
* Briefly describe Network Access Security and Network Domain Security.
* Discuss the attacks on 3G and 4G network

1. **LM8. Learning Material & Study Guide**

* Describe the security vulnerabilities present in 1G cellular network (no security, ESN cloning)

<https://books.google.com/books?id=IHg0JBShDhEC&pg=PA369&lpg=PA369&dq=security+in+first+generation+traditional+wireless+networks&source=bl&ots=l41aXRqaZG&sig=oovVfZ5rO0fHByWNvBH2gxi1eG4&hl=en&sa=X&ved=0ahUKEwj3ysn71-rUAhXLdj4KHc9lBI8Q6AEIMTAC#v=onepage&q=security%20in%20first%20generation%20traditional%20wireless%20networks&f=false> (just the first page)

* Describe the security architecture of GSM (core network and access network);

<https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=0ahUKEwjz6t612-rUAhXHzz4KHV7FAksQFghBMAM&url=https%3A%2F%2Fwww.sans.org%2Freading-room%2Fwhitepapers%2Ftelephone%2Fgsm-standard-an-overview-security-317&usg=AFQjCNEVQqhFN991Ei5NxPmDY5V_wCnSiA&cad=rja> (pdf file is also available in learning module).

--GSM Security Overview – page 4.

--Authentication – page 5

--Anonymity (TMSI & IMSI) – page 5 & 6.

--Encryption and decryption of data (A3, A5, and A8 algorithm). Page (6-7)

* Describe the existing issues in GSM security

<https://arxiv.org/pdf/1002.3175.pdf> (pdf is also available in learning module. section 3, just overview of the each vulnerabilities.)

* Discuss the security improvement of 3G and 4G LTE network comparing to GSM

<https://www.researchgate.net/publication/235339185_Security_of_3G_and_LTE> (pdf file is also available in learning module. (Introduction section)

* Describe the security features of UMTS (3G) and LTE (4G)

<https://www.researchgate.net/publication/235339185_Security_of_3G_and_LTE> (pdf file is also available in learning module. (Security features section up to figure 3)

* Briefly describe Network Access Security and Network Domain Security.

<https://www.researchgate.net/publication/235339185_Security_of_3G_and_LTE> (pdf file is also available in learning module. (Security features section, A and B subsections. Just read the overviews of each subsection. No need to know the technical details.)

* Discuss the Crypto-attack, Denial of Service attack, Side-Channel attack on 3G and 4G network

<https://www.researchgate.net/publication/235339185_Security_of_3G_and_LTE> (pdf file is also available in learning module. (Attacks section, just the overview, not technical details)