



Technical talk on Recent Development in 5G EMF Policies, Guideline, Radiation Measurement and Monitoring

by Ir. Dr. Huzein Fahmi bin Hawari

Ir. Dr Huzein Fahmi bin Hawari is currently the Honorary Secretary cum Treasurer in Electronic Engineering Technical Division (eETD).

Recently, there has been a lot of hype about 5G technology and its potential to change the way we do and be connected. The 5G race is on and carriers around the globe, including in Malaysia, are racing to conduct 5G trials in a new and innovating ways. So, what is the latest development in 5G Electromagnetic Fields (EMF) policies, guideline and measurement technique?

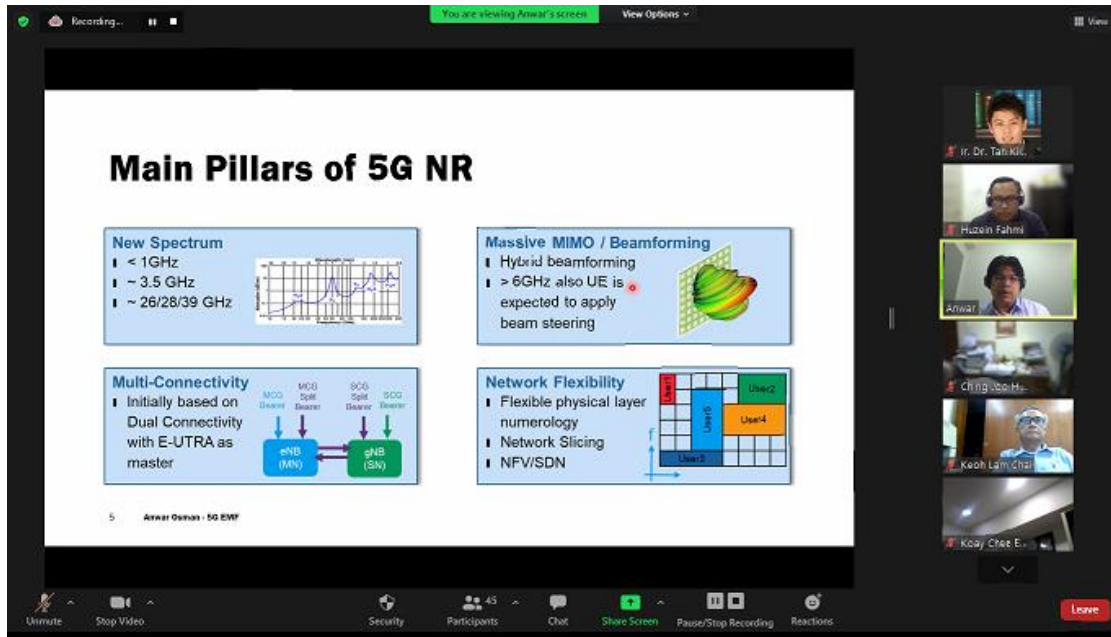
Electronic Engineering Technical Division (eETD) together with IEM (Penang Branch) has taken the initiative to collaborate with Technological Association Malaysia (TAM), The Institution of Engineering and Technology (IET) and Institute of Electrical and Electronics Engineers (IEEE) MTT/EDS/SSC Penang Chapter to organize a technical talk entitled “Recent Development in 5G EMF Policies, Guideline, Radiation Measurement and Monitoring” via Zoom virtual platform from 6pm to 8pm on 27th May 2021. The speaker for the technical talk was Mr. Anwar Faizd Osman, who has over 17 years of experience in Wireless Communication and Mobile Network testing. He is also currently the Vice Chair, Malaysian Technical Standards Forum Bhd (MTSFB) International Mobile Telecommunications (IMT) and Future Network Working Group Malaysia.



Group photo of the participants

The moderator, Ir. Dr. Huzein Fahmi bin Hawari, started the talk by providing a brief introduction about the talk, followed by the speaker’s introduction. He then welcomed the speaker, Mr. Anwar Faizd Osman to begin his sharing. Mr. Anwar started off with the introduction of 5G technology, the main pillars of 5G

New Radio (NR) and evolution of the mobile communication. He also shared that massive Multiple-input/multiple-out (MIMO) has become a default key technology for 5G NR.



Mr. Anwar sharing on the main pillars of 5G NR

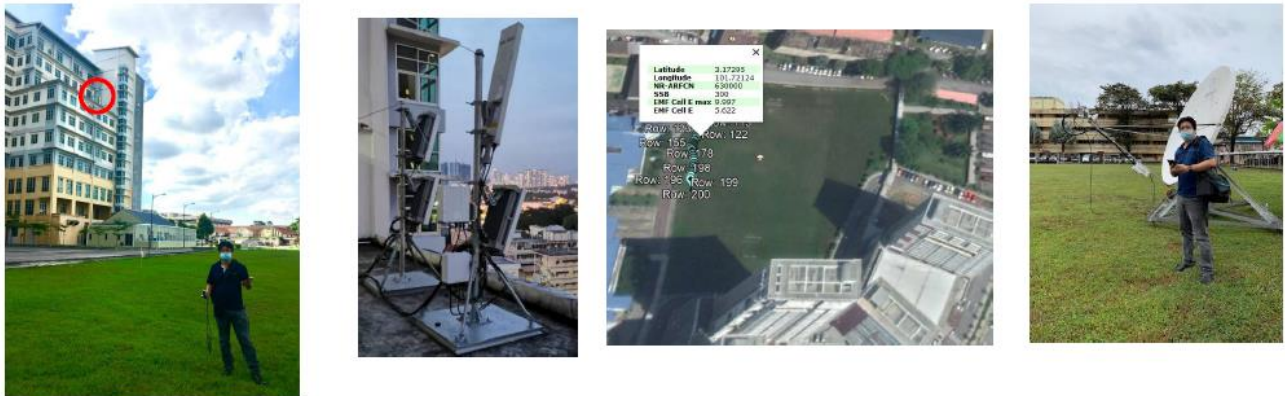
He then presented the case studies on recent development of 5G (EMF) exposure policies, guideline and standards at various countries. One of the case studies shared was the EMF exposure of sixteen 5G-enabled mobile phone base stations, deployed at 22 sites in 10 UK cities. It is observed the highest level observed in the band used for 5G was just 0.039% of the reference level for public exposure based on the 1998 International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines. He also addressed some of the public misconception and open issues related to 5G & EMF such especially on health related concern.

Exposure scenario	Frequency range	REFERENCE LEVELS			Parameters considered for compliance (< reference level)
		Incident E-field strength, E_{inc} (V m ⁻¹)	Incident H-field strength, H_{inc} (A m ⁻¹)	Incident power density, S_{inc} (W m ⁻²)	
Occupational workers	0.1 MHz - 30 MHz	$660/f_M^{0.7}$	$4.9/f_M$	N/A	Both E_{inc} and H_{inc}
	> 30 MHz - 400 MHz	61	0.16	10	NF: Both E_{inc} and H_{inc} FF: Either $E_{inc}/H_{inc}/S_{inc}$
	> 400 MHz - 2 000 MHz	$3 f_M^{0.5}$	$0.008 f_M^{0.5}$	$f_M/40$	NF: N/A FF: S_{inc} only
	> 2 GHz - 300 GHz	N/A	N/A	50	NF: N/A FF: S_{inc} only
Public	0.1 MHz - 30 MHz	$300/f_M^{0.7}$	$2.2/f_M$	N/A	Both E_{inc} and H_{inc}
	> 30 MHz - 400 MHz	27.7	0.073	2	NF: Both E_{inc} and H_{inc} FF: Either $E_{inc}/H_{inc}/S_{inc}$
	> 400 MHz - 2 000 MHz	$1.375 f_M^{0.5}$	$0.0037 f_M^{0.5}$	$f_M/200$	NF: N/A FF: S_{inc} only
	> 2 GHz - 300 GHz	N/A	N/A	10	NF: N/A FF: S_{inc} only

Reference levels for exposure to EMF (Source: ICNIRP 2020)

For the next section, Mr Anwar proceeded with the sharing of 5G EMF radiation measurement differences as compared to legacy measurement of 2G, 3G and 4G mobile technologies. He mentioned that with the commercial 5G NR network roll-out, EMF measurements would be a major prerequisite to prove that the radiation is below a certain limit. He further elaborated that extrapolation factors help to measure and calculate the maximum EMF value when performing code-selective (for 5G) EMF measurements on SSB signals. Mr Anwar also stressed that 5G EMF radiation measurement has become more critical and challenging where he then proceeds to share the recent procedures of 5G EMF measurement.

Towards the end of the talk, Mr. Anwar also shared some of the 5G EMF measurement case study conducted from actual 5G sites in Malaysia such as at Digi 5G OpenLab at RekaScape, Cyberjaya and in UTM KL.



5G EMF measurement conducted at UTM KL

The technical talk has attracted 45 participants from different organization such academics, researchers and industry. Overall, it was a good technical sharing on the latest 5G development for the IEM members who took part in the talk.