THE PROTOTYPE DEVELOPMENT OF RADIO FREQUENCY (RF) DATABASE LEVEL IN MALAYSIA

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INTRODUCTION

The application of radio frequency (RF) radiation technology has become very significant to wireless communication system technology. RF radiation (in wave form) is essential medium to provide best communication system both for mobile telephone and internet broadband. Besides of its benefits, RF which categorised as non-ionising radiation (NIR) has been seen as a threat to human being.

Members of public has significantly raised issues on RF radiation emitted by the telecommunication structure particularly on safety and health aspects to the human health. This is due to the telecommunication structures are placed on the roof top of buildings, adjacent to residential, school and commercial areas. Members of public are worry because of involuntary exposure, media attention, unfamiliar with the concept of Radio Frequency (RF), risk to future generation and low trust to the information on RF due to lack of local data and facts available. This project is to develop database which provide information on RF radiation to the members of public in order to mitigate misunderstanding and wrong perception towards RF radiation.

SCOPE OF PROJECTS

- Scope of the project is developing a system that capable of storing data and information of RF level in Malaysia.
- This database is consist of information on non-ionizing radiation including radio frequency radiation facts in English and Malay.
- This system could facilitate citizen of Malaysia to access information of the RF levels at their respective locations.
- The RF level would include radiation emitted by all network service provider available in Malaysia including CELCOM, DIGI Telecommunication, Maxis, Pi Wimax, YTL Communications, U-Mobile, Sapura and others.
- Provide analysis of RF level exposure as compared with the standard guidelines issued by the Malaysian
- Communications and Multimedia Commission (MCMC) and the International Committee on Non-Ionising Radiation Protection (ICNIRP).

OBJECTIVES OF THE PROJECT

- To develop RF database which store data of RF level around Malaysia.
- To develop a system interacts with the database which simplifies the process of data creation, modification and deletion.
- To provide friendly interface for public to view data of RF level in their respective area in Malaysia.
- To mitigate misunderstanding and wrong perception towards the non-ionising radiation emits by the telecommunication structure.
- To establish RF Data syndication at national level

RF RADIATION FUNCTION IN WIRELESS COMMUNICATION SYSTEM

Figure 1: Telecommunication structure located adjacent to residential and commercial area

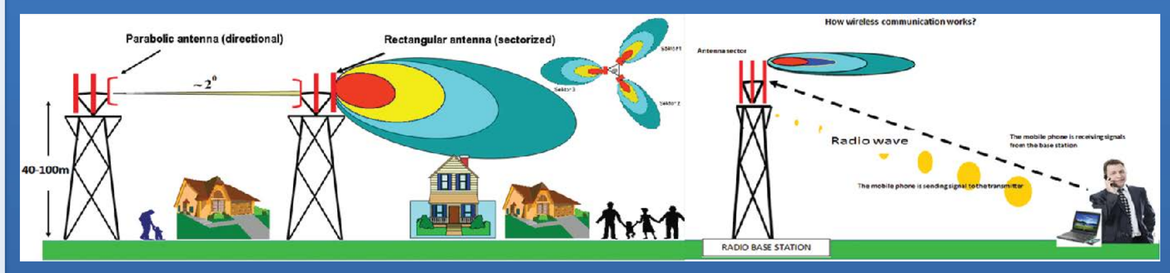

Figure 2: Wireless communication is using radio wave to transmit and receive signals

MEDIA ATTENTION ON RF RADIATION ISSUES RAISED BY MEMBERS OF PUBLIC

Figure 3 : Newspaper article on RF issues

RF RADIATION ASSESSMENT

RF assessment is conducted due to public complaint which aimed to know the RF radiation level at their concern area. NIR Group of Nuclear Malaysia has measured more than 550 of radio base station around Malaysia. Information are kept in the form of hard copy reports. The RF radiation level will be compared and should comply to the permissible exposure limits accordance to Malaysian Communication and Multimedia Commission (MCMC) and International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Frequency (MHz)	Electric Field Strength (V/m)	Power Density ($\mu W/cm^2$)
1 MHz – 10 MHz	$87f^{0.5}$	-
10 MHz- 400 MHz	28	200
400 MHz – 2GHz	$1.375f^{0.5}$	f/2
2 GHz – 300 GHz	61	1000

Table 1: RF radiation permissible exposure limits for members of public

Figure 4: RF radiation assessment around telecommunication structure adjacent to residential area and school

BENEFITS vs ISSUES ?

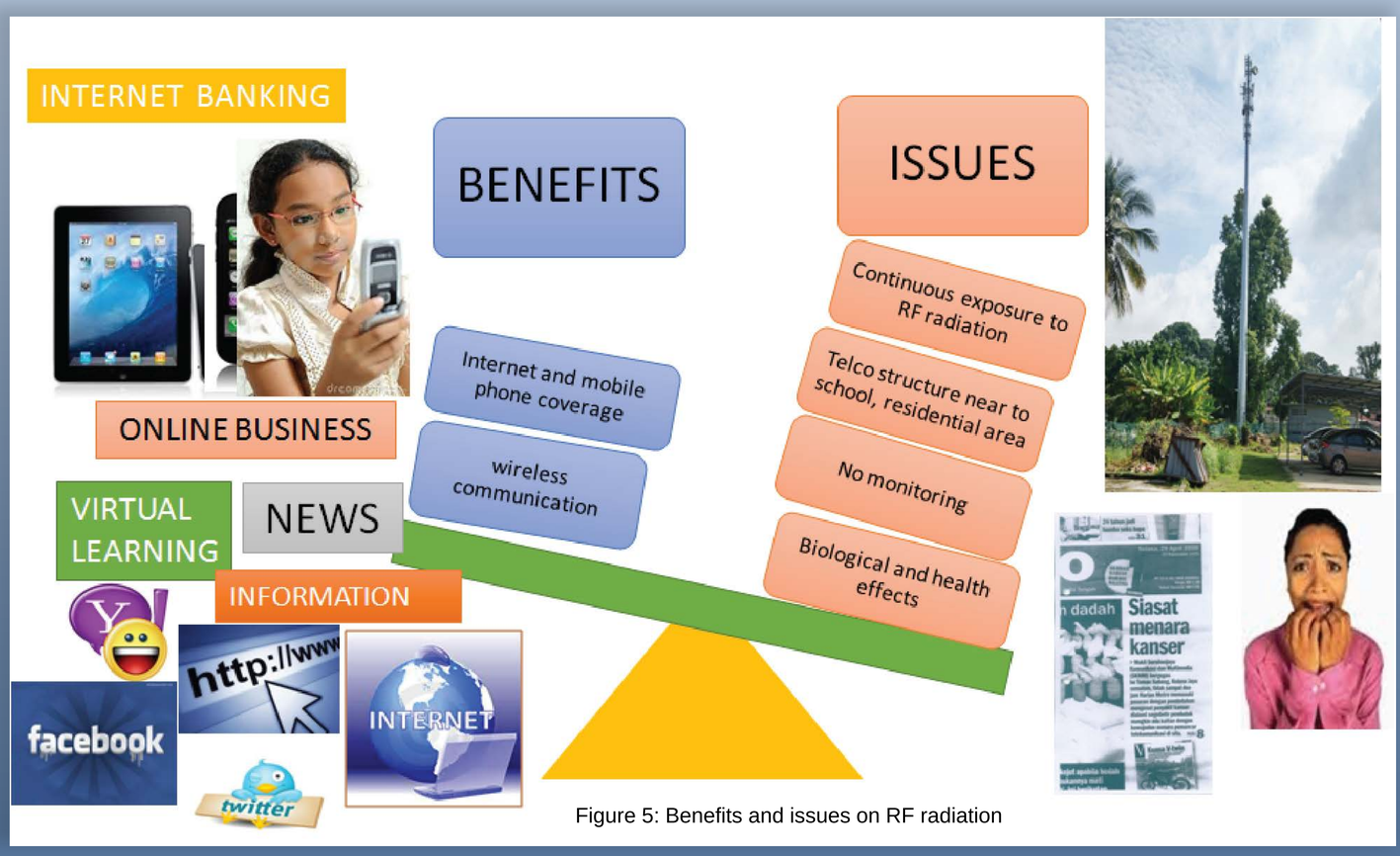

Figure 5: Benefits and issues on RF radiation

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DATABASE SYSTEM

- This database is web base system where information can be accessed through the internet.
- This system is using open source base technology
- Prototype of this system is developed by using php and MySql.
- This system can be extended into mobile base access - mobile application and can be accessed by using smart phone

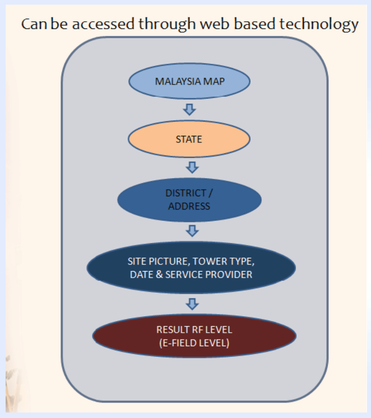

Figure 6 : Flow of information

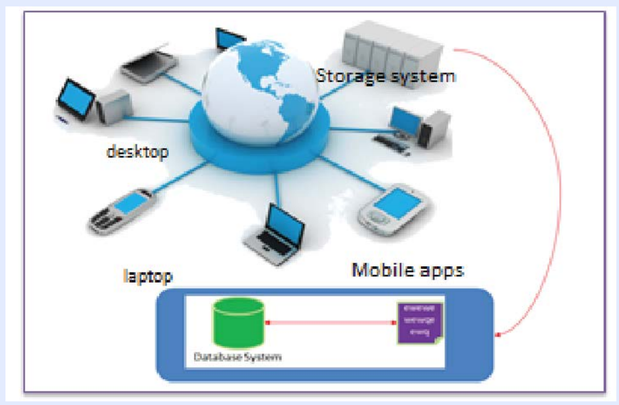

Figure 7: Structure of the database system

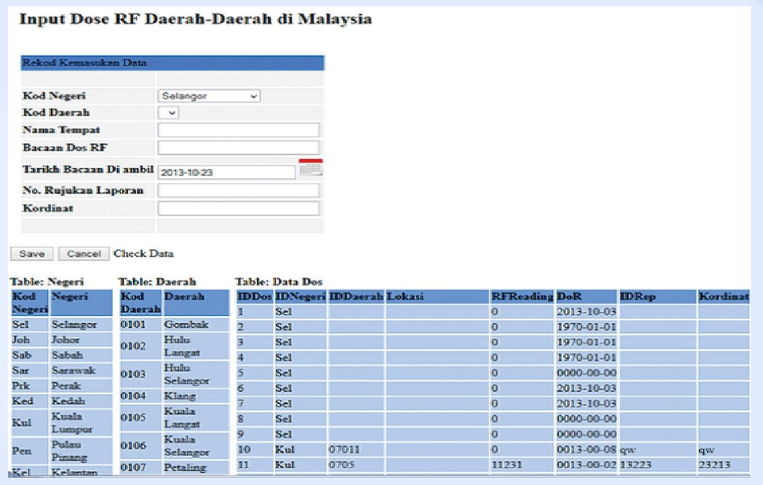

Figure 8: Back end of the database system

NON IONISING RADIATION INFORMATION IN ENGLISH AND BAHASA MELAYU

NIR has long wavelengths (more than 100nm) and low photon energy (less than 12.4eV). NIR cannot be seen with naked eye, but if its intensity is high enough, it could exist as heat or any biological stimulation. The ability of NIR to penetrate human and the sites of absorption that cause adverse health effects is highly dependent on the frequency. NIR can be further classified into four approximate regions:

- Static electric and magnetic fields
- Extremely low frequency (ELF)
- Radiofrequency (RF) and Microwave (MW) radiation
- Optical radiations

Radiofrequency radiation is categorised as electromagnetic field (EMF) radiation which consist of waves and has both electric field (V/m) and magnetic field (A/m) component. RF waves can be characterized by their wavelength and frequency. Radiofrequency has been thoroughly exploited for the maximum benefits of mankind in design and operation of equipment in most applications as follows:

- Telecommunication
- Manufacturing and processing industry
- Radar (Surveillance, defence and security)
- Navigation system
- Broadcasting
- Medical equipment
- Consumer products

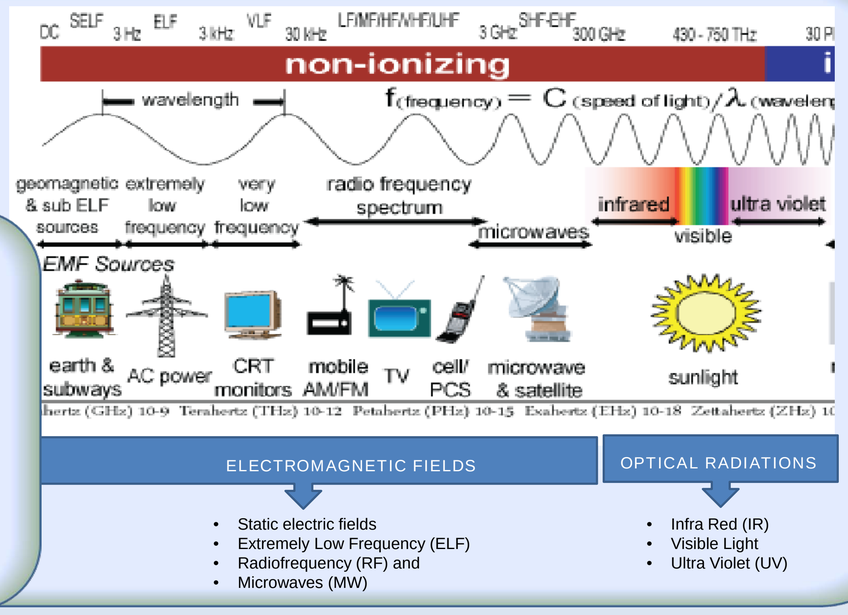

Figure 8: Equipment for RF assessment and data acquisition process

Data and information can be accessed through internet via website

Figure 10 : RF level at specific location

Figure 11: Information of the specific location which can be accessed by the members of public

BENEFITS OF THE DATABASE

- Preserving RF Radiation data into electronic means is important in Malaysia's context.
- Development of RF Database inline with RF information system significantly improve the management of RF data as well as routine operation.
- Once, RF radiation data electronically stored, it can be easily enhanced and flexibly used in the future.
- This project significantly important to provide platform for public access through the electronic medium (Web, Mobile etc.).
- Towards the establishment of the RF Radiation database as a national reference in Malaysia.

CONCLUSION

- Prototype of Malaysian RF database is successfully developed and can be accessed through internet.
- This prototype system is user friendly interface for public information on NIR and RF level in their respective area.
- This system can be used to mitigate misunderstanding and wrong perception towards the non-ionising radiation
- specifically RF radiation emits by the telecommunication structure.

Ok… sekarang saya dapat banyak maklumat mengenai NIR dan RF dari website ini. Sekarang lebih faham.

Aras RF adalah dalam kadar yang dibenarkan…

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