	EMF/NIR Report	Radiofrequency electromagnetic fields measurement survey		
	Version	Reference#	Issue Date	Issued by
	1.0	2021/10	10th Sept. 2021	J Vila

1. Measurement survey characteristics

Measurement date:	7th September 2021
Measurement time:	13:45 am – 15:00 pm
Measurement point & location:	Westmoreland Street-Fleet Street, Dublin, Co Dublin
GPS coordinates:	53°20'45.6" N; 6°15'34.2" W
Survey staff:	Javier Vila, Michael Murray
Purpose of the survey:	1) To carry out measurements of radiofrequency (RF) electromagnetic fields (EMF) at a location within Dublin city with high daytime population. 2) To determine typical RF EMF levels and compare them with relevant exposure limits recommended by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). This survey is part of the EPA's national EMF monitoring programme (see reference EPA 2020 for more details).
Measurement point description:	Outdoor public space typically busy due to available amenities in the area.

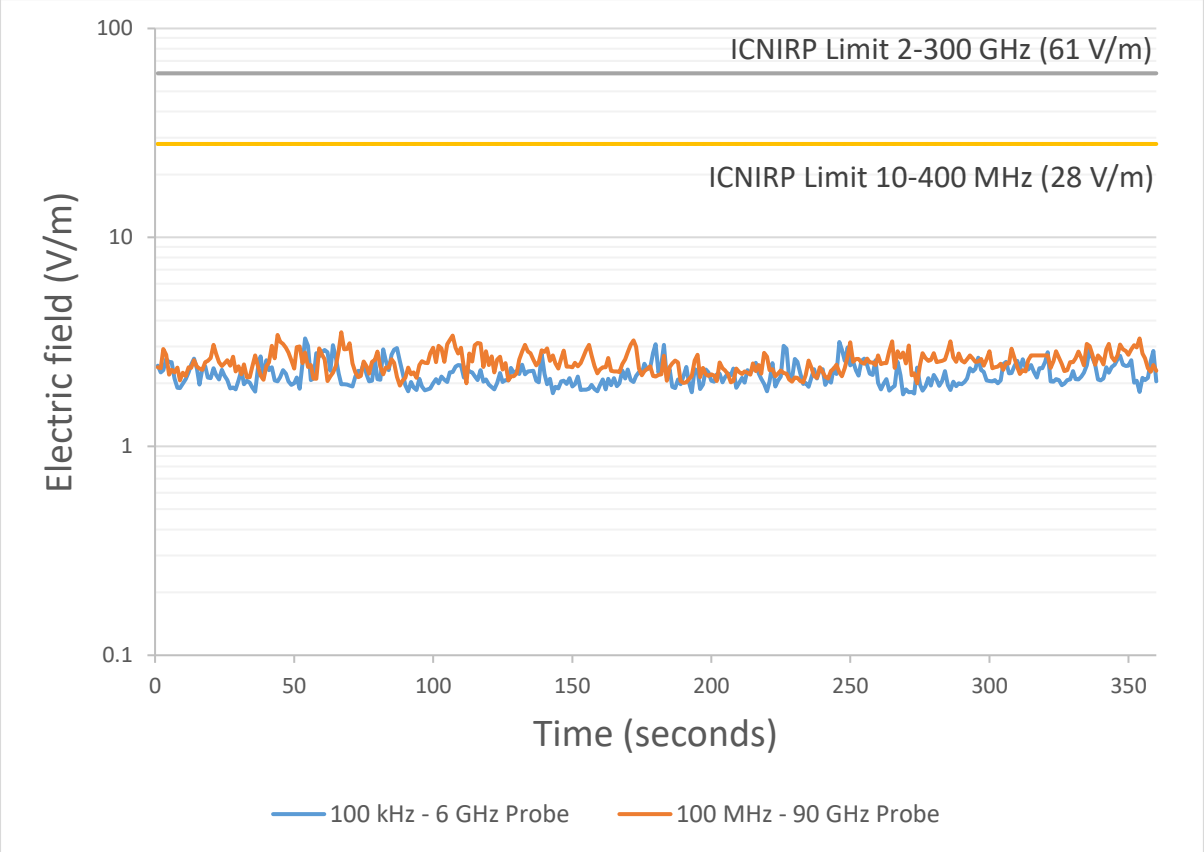
2. Summary of survey results

Measurement result:	The average total RF level measured was 2.22 V/m. This value is below ICNIRP's recommended exposure limits of 28 V/m for radiofrequencies < 400 MHz and 61 V/m for radiofrequencies > 2 GHz.
Measured RF sources/signals:	2G (GSM), 3G (UMTS), 4G (LTE), 5G (NR-3.6), FWALA, TETRA, Wi-Fi
Number of nearby telecommunication sites:	4 nearby sites (see map on page 4 for details). This information was obtained from the ComReg's website https://siteviewer.comreg.ie/

3. Measurement methodology and results

Broadband and frequency-selective EMF measurements were performed at a location in Dublin city centre (King St-Grafton St) known to have a high daytime population. The charts and tables below contain the summary results for total RF electric fields (Table 1 & Figure 1) and frequency-specific RF electric fields (Table 2 & Figure 2) for the selected location and time of the day using various configurations, including the use of a 5G-enabled mobile phone handset in the proximity of the measurement point while streaming video to identify any potential nearby 5G signals.

Figure 1. Total RF electric field levels at measurement point using two broadband probes.



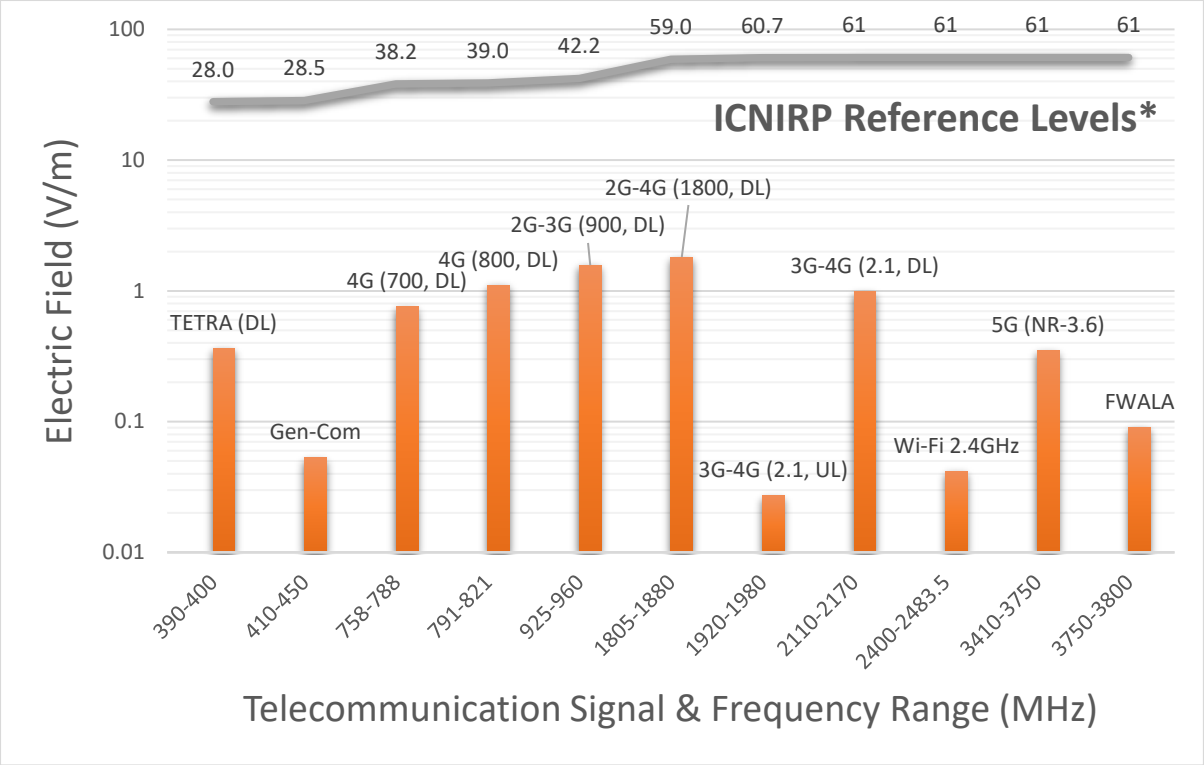
Note: This graph represents total average (rms) RF electric fields measured for 6 minutes (360 seconds) using two different RF probes (100 kHz - 6 GHz and 100 MHz – 90 GHz) as described on the graph legend. Total RF fields include exposures from all RF sources (signals), depending on the probe used. *Strictest ICNIRP reference level for the entire RF range.

Table 1. Summary of total RF fields at measurement point using two broadband probes.

Probe Frequency Range	Average electric field (V/m)	Average power density (W/m^2)	Maximum electric field (V/m)	Maximum power density (W/m^2)	ICNIRP reference level (V/m)	ICNIRP reference level (W/m^2)
100 kHz - 6 GHz	2.22	0.013	3.28	0.029	28*	2*
100 MHz - 90 GHz	2.52	0.017	3.52	0.033	28*	2*

Note: RF electric field data obtained with Narda NBM-550 meter with EF0691 and EF9091 probes. *Strictest ICNIRP reference levels for the entire RF frequency range. These data have a maximum overall uncertainty around ±41% (±3 dB).

Figure 2. Frequency-specific radiofrequency electric field level by telecommunication signal



Note: RF electric field data above the noise threshold for 6-min average (rms) obtained with SRM-3006 meter/spectrum analyser using 3501/03 and 3502/01 probes. *ICNIRP reference level for each corresponding frequency range. 2G: GSM; 3G: UMTS; 4G: LTE; DL: Downlink; UL: Uplink; Gen-Com: This freq. range includes a mixture of amateur, PMR and land mobile signals; FWALA: Fixed Wireless Access Local Area.

Table 2. Measured average and maximum frequency-specific field level by RF source/signal.

RF Source / Telecommunication Signal	Frequency Range (MHz)	Maximum Electric Field/ Power Density		Average Electric Field/ Power Density		ICNIRP Reference Level[b]	
		(V/m)	(W/m^2)	(V/m)	(W/m^2)	(V/m)	(W/m^2)
TETRA (DL)	390-400	0.51	0.00068	0.36	0.000347	28.0	2.0
Gen-Com	410-450	0.25	0.00016	0.05	0.000007	28.5	2.2
4G (700, DL)	758-788	1.41	0.00524	0.76	0.001518	38.2	3.9
4G (800, DL)	791-821	2.14	0.01215	1.10	0.003233	39	4.0
2G-3G (900, DL)	925-960	2.08	0.01142	1.57	0.006555	42.2	4.7
2G-4G (1800, DL)	1805-1880	3.57	0.03381	1.82	0.008738	59.0	9.2
3G-4G (2.1, UL)	1920-1980	0.05	0.00001	0.03	0.000002	60.7	9.8
3G-4G (2.1, DL)	2110-2170	1.66	0.00734	0.99	0.002577	61	10
Wi-Fi 2.4GHz	2400-2483.5	0.10	0.00003	0.04	0.000005	61	10
5G (NR-3.6)	3410-3750	1.36	0.00487	0.35	0.000320	61	10
FWALA	3750-3800	0.35	0.00032	0.09	0.000022	61	10

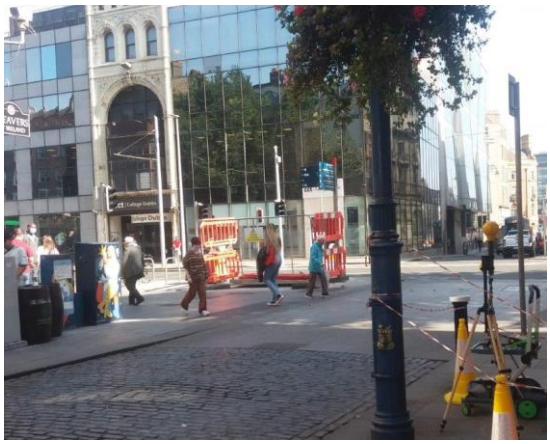
Note: RF electric field data above the equipment noise threshold for 6-min average (rms) obtained with SRM-3006 meter using 3501/03 and 3502/01 probes. These data have a maximum overall uncertainty around ±41% (±3 dB). [b]ICNIRP reference level for each corresponding frequency range. 2G: GSM; 3G: UMTS; 4G: LTE; DL: Downlink; UL: Uplink; Gen-Com: This freq. range includes a mixture of amateur, PMR and land mobile signals; FWALA: Fixed Wireless Access Local Area.

5. Conclusion – Total & Frequency-Specific RF field levels

Measured (average and maximum) total RF electric field levels (Figure 1 & Table 1) were below the strictest ICNIRP recommended exposure limit for the entire RF frequency range (i.e. 28 V/m). The average total RF level was 2.22 V/m. Measured (average and maximum) frequency-specific RF electric field levels for all detected signals (Figure 2 & Table 2) were low (< 4 V/m). All the signals measured were below the corresponding ICNIRP recommended exposure limits of 28 V/m for radiofrequencies < 400 MHz and 61 V/m for radiofrequencies > 2 GHz. The highest RF electric field level at the point of measurement (3.57 V/m) is likely to correspond to the emission (downlink) from nearby 2G-4G (1800 MHz band) antennas. 5G signals were detected at the point of measurement, with a maximum level of 1.36 V/m. Measurements carried out while streaming video on a 5G phone did not change the readings.

6. Map of measurement point and nearby telecommunication sites

7. Photo of measurement point (Westmoreland St - Fleet St)



Appendix

A1. Equipment characteristics and calibration

The following EMF measurement equipment were used:

- Narda SRM-3006 frequency-selective meter and spectrum analyser.
- Narda NBM-550 broadband survey meter.
- Narda probes covering a frequency range between 100 kHz and 90 GHz.
- All equipment was calibrated in July 2019.

A2. References

- EPA 2020. EMF Monitoring Programme 2021-2023. https://www.epa.ie/radiation/emf/emfmonitoringprogramme/

- ECC RECOMMENDATION (02)04. Measuring Non-Ionising Electromagnetic Radiation (9 kHz – 300 GHz) (Bratislava 2003, Helsinki 2007) www.erodocdb.dk/Docs/doc98/official/pdf/REC0204.PDF

- I.S. EN 62232-2017. Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure. NSAI Standards; CENELEC 2017 https://shop.standards.ie/en-ie/

- European Commission (EC) 1999/519/EC: Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) https://op.europa.eu/en/publication-detail/-/publication/9509b04f-1df0-4221-bfa2-c7af77975556/language-en

- International Commission on Non-Ionizing Radiation Protection (ICNIRP). Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz). Health Physics 2020 May;118(5): 483-524 https://pubmed.ncbi.nlm.nih.gov/32167495/