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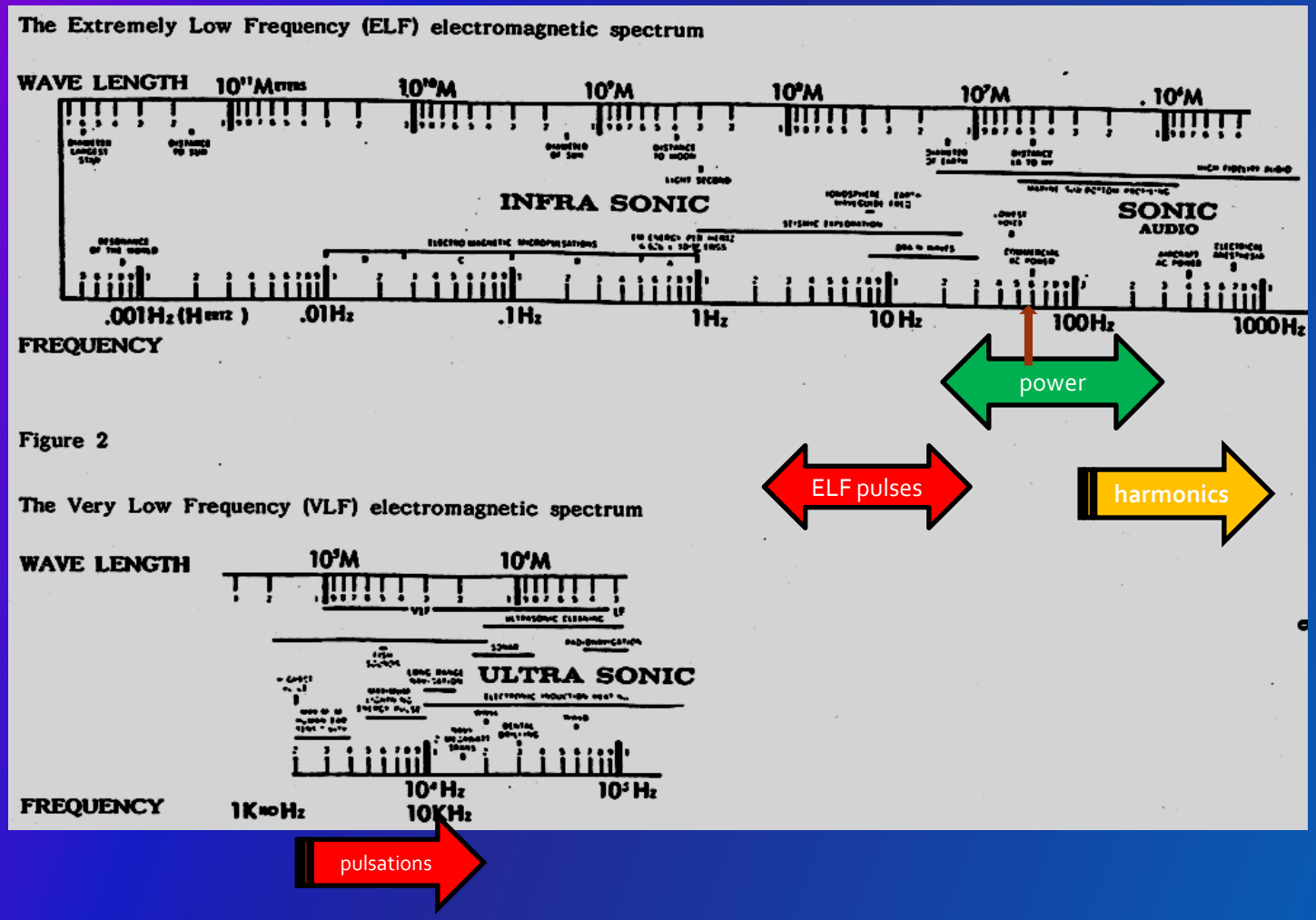
Ottawa

Presentation to the **Ontario Association of Home Inspectors** – Ottawa
January 9, 2014

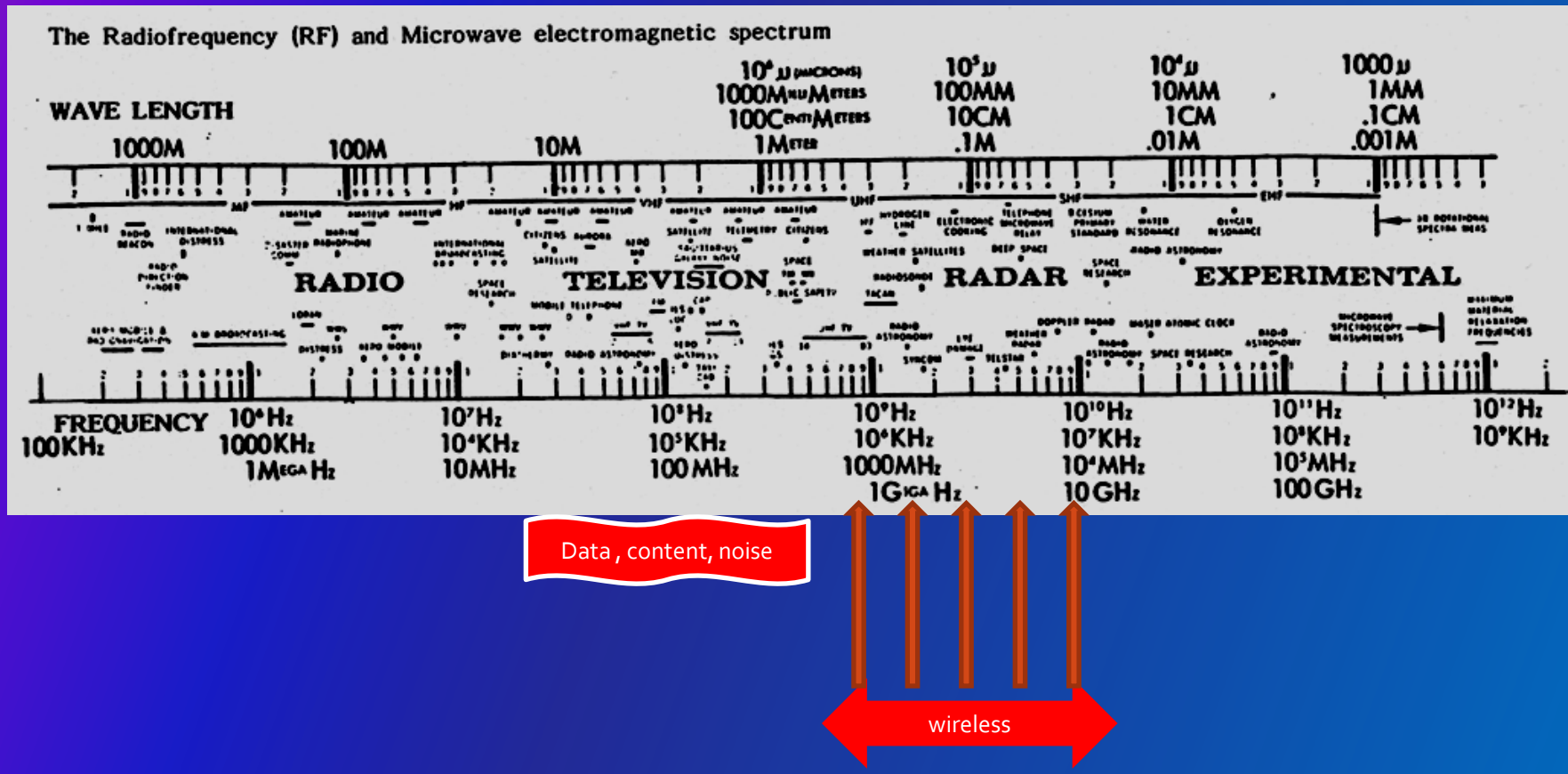
ELECTROMAGNETIC FIELD ISSUES & MITIGATION / SOLUTIONS

$\omega = 2\pi f$ (wavelength / frequency formula)



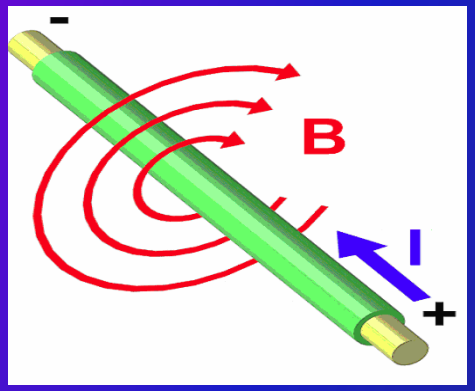
Electromagnetic field issues & mitigation / solutions

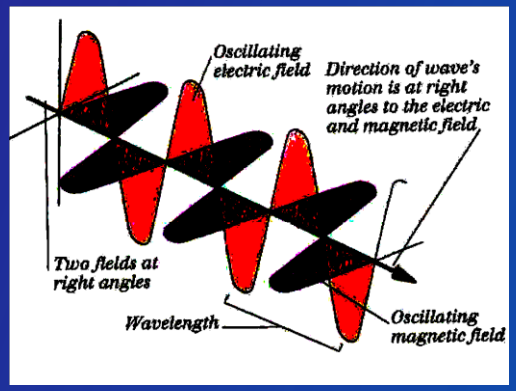
Andrew Michrowski

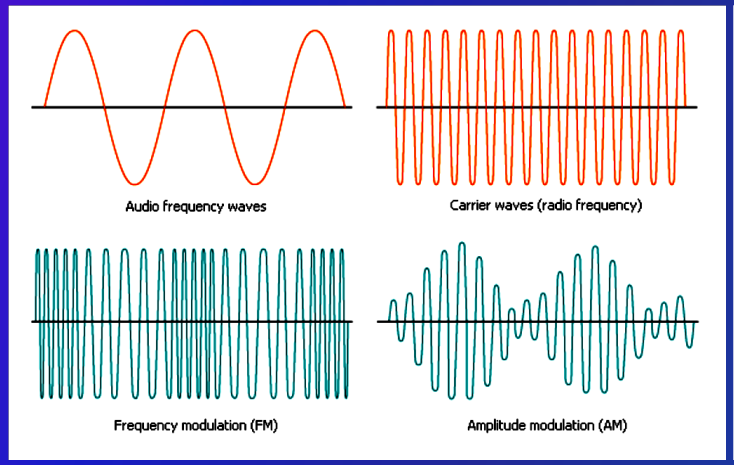


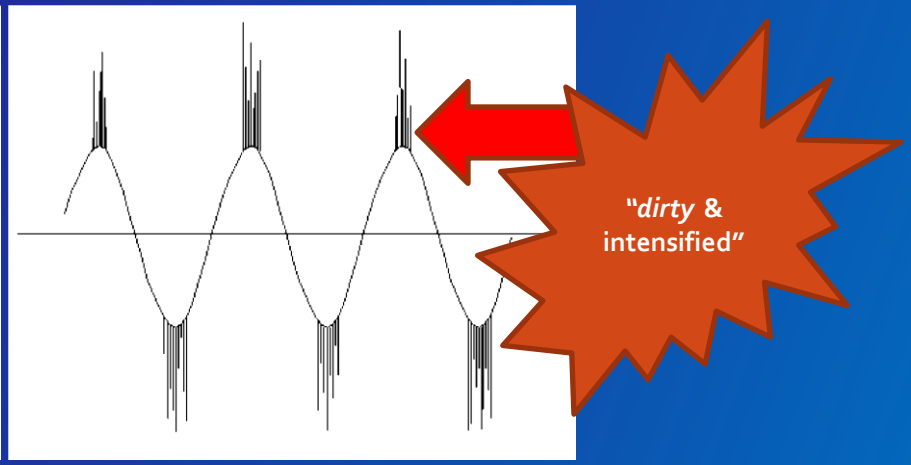
W (Watt – power) **= V** (Volt – electric) **x I** (Ampère - magnetic**)**

100 Watts passes through 1 Ampère at 100 Volts.



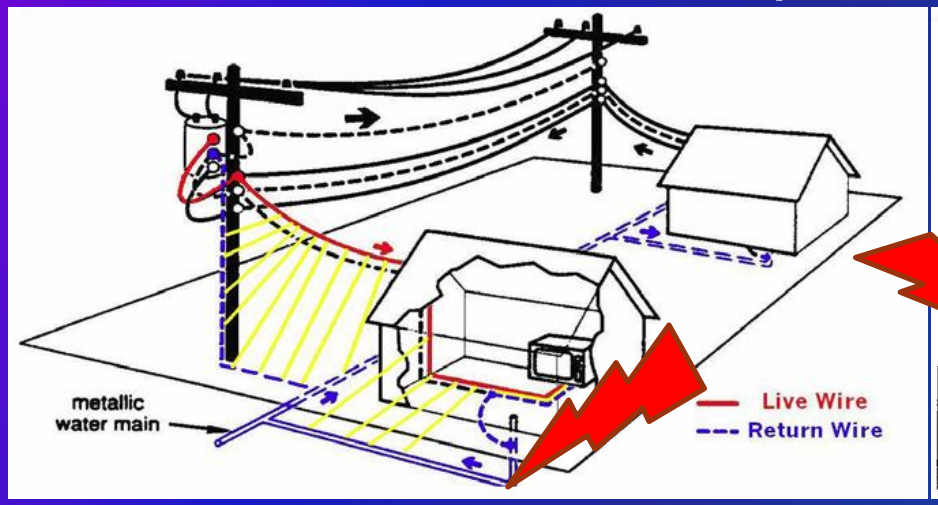


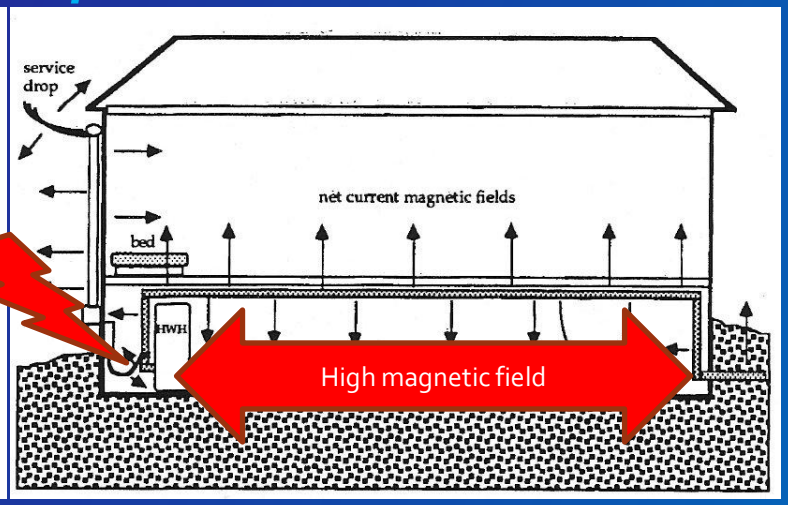


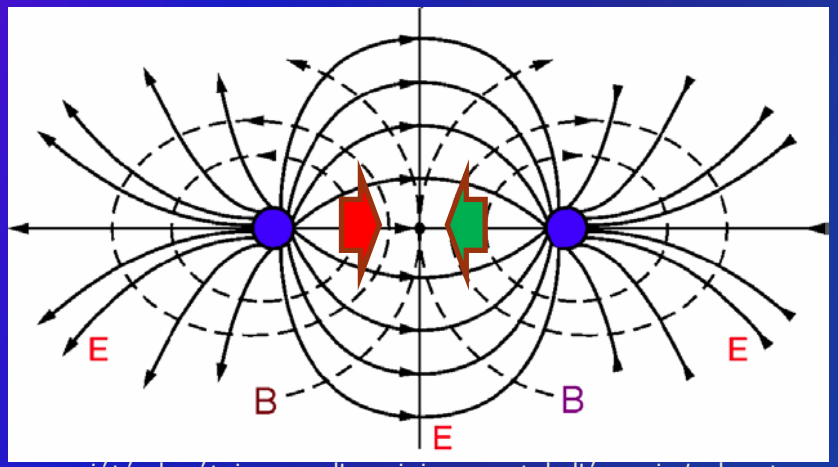


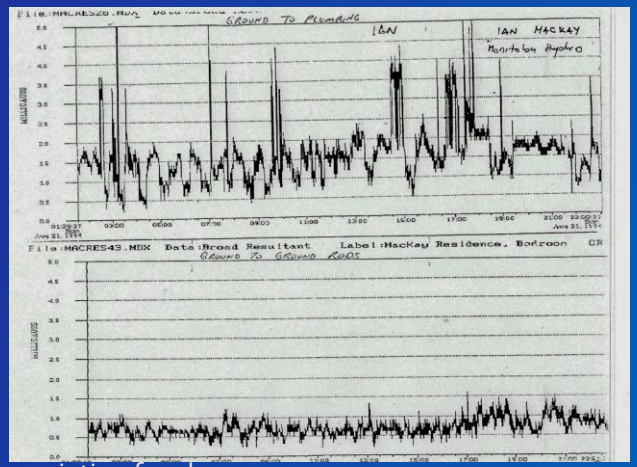
POWER ELECTRICITY - Net current:

1,000 nT = 10 mG = *1 μT* / *1 Amp at 1m* = 2 mG









POWER ELECTRICITY - *Net current:*

Solving this problem helps to **reduce** magnetic field levels

Net current and single conductor current disperse at:

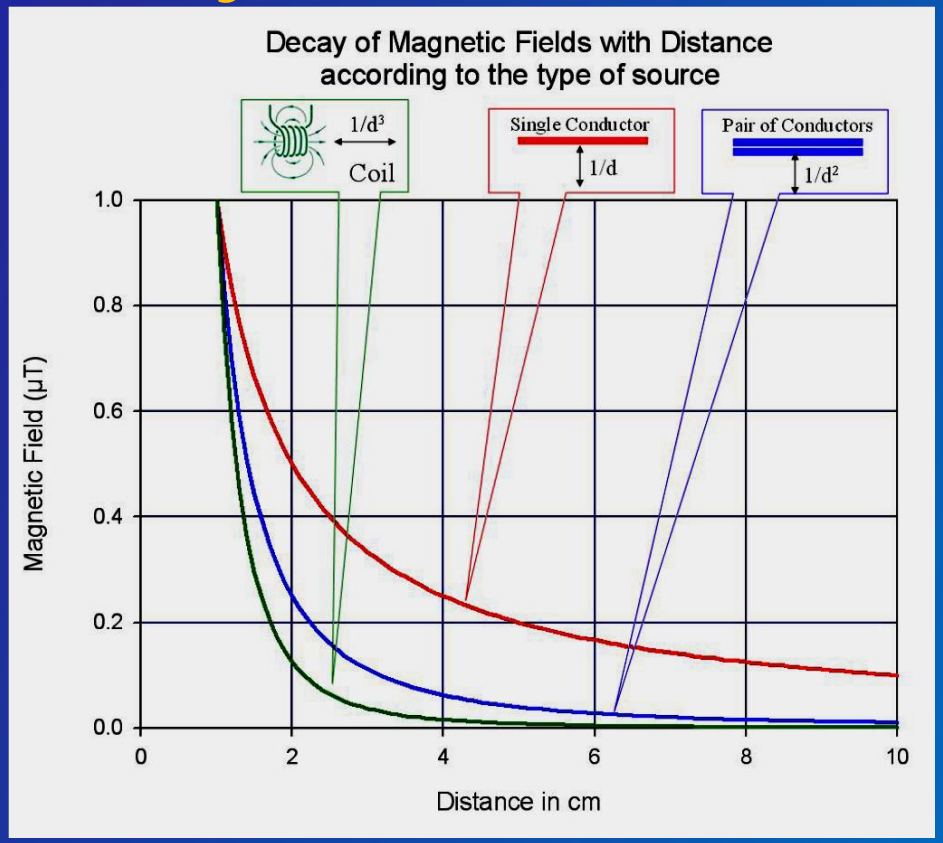
1/R (radius),

instead of

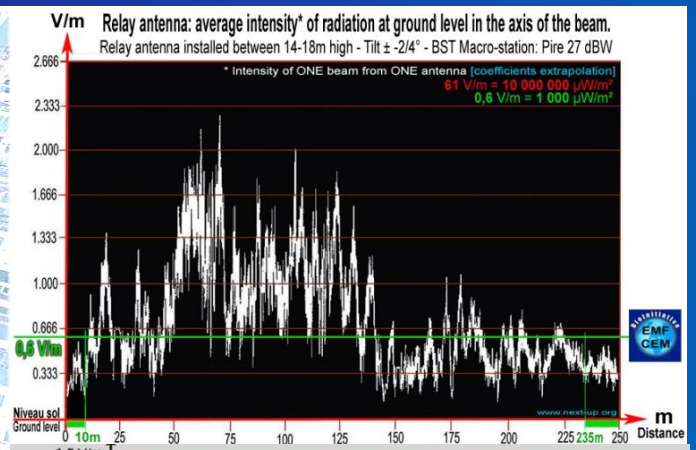
$1/R^2$ in typical wiring

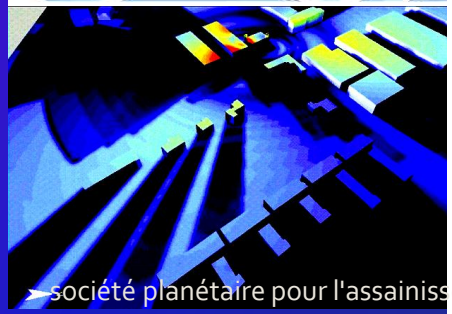
or

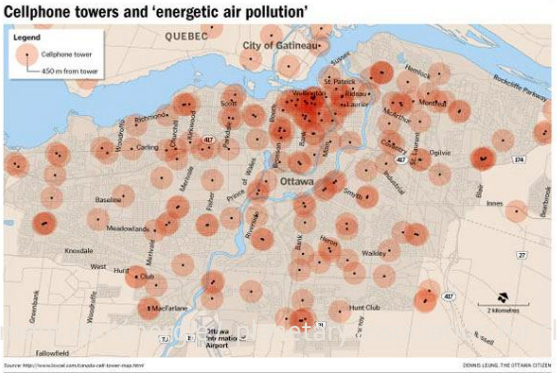
$1/R^3$ in transformers.

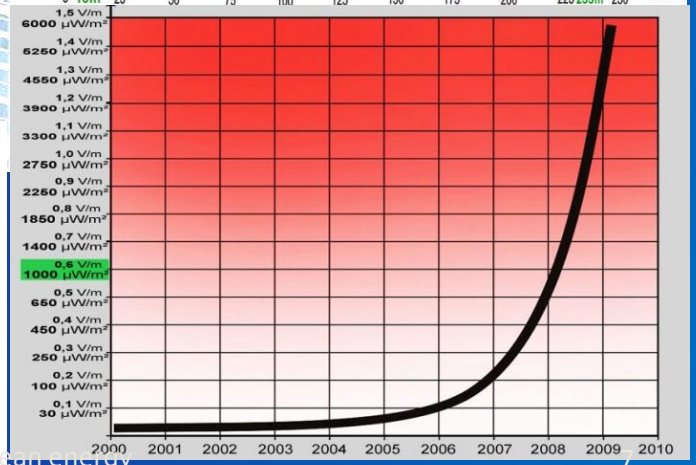


Background propagation of WIRELESS technology: Salt Lake City: at street level; France: typical background levels 2000 – 9 > 0,6 μW/cm²); | Montréal & Toronto 2012: 0,1 à 25 (zones > 100 μW/cm²); Salzburg: shadow effects , Ottawa: tower sites.

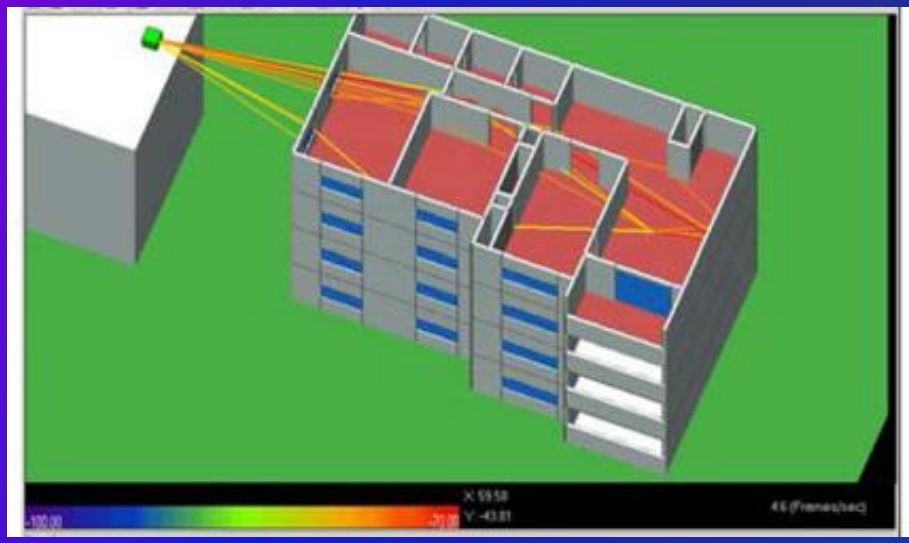


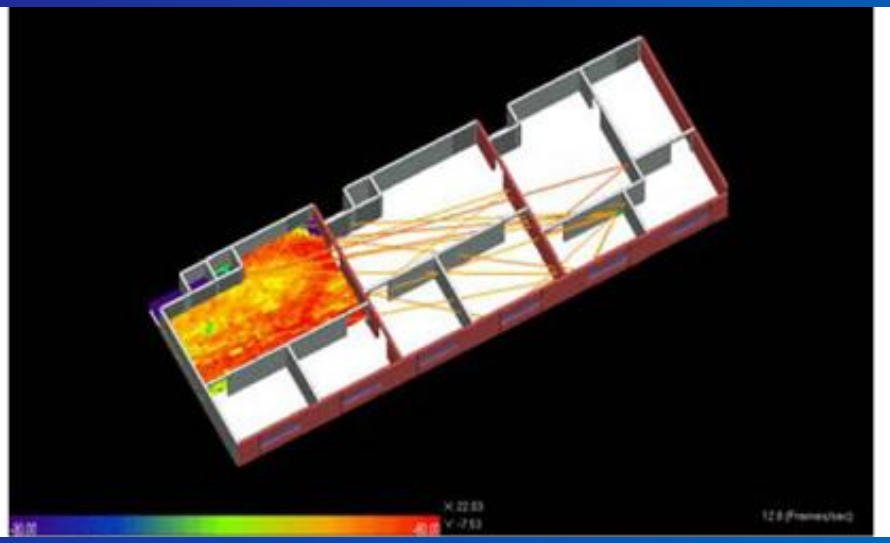






Wireless technology: Reflection



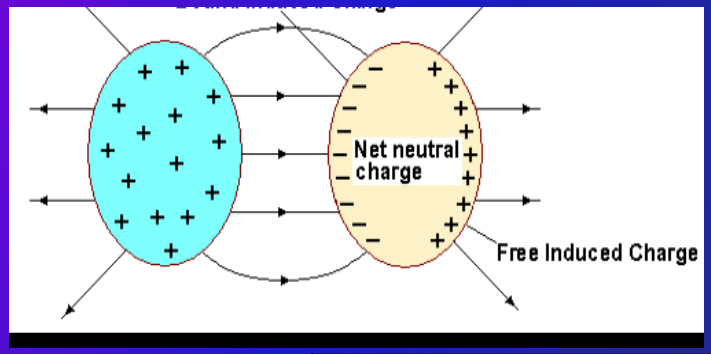


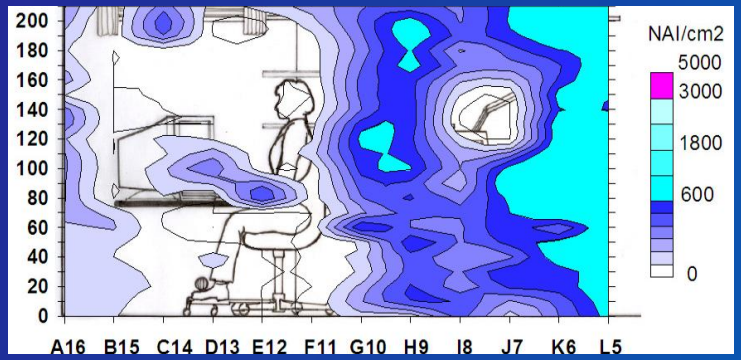
Prudent avoidance – applied:

location of appliances

Ions: diametre /contaminant, μ metre, bi-polar charges, ion contours.

(Can be generated by WIRELESS TECHNOLOGY)



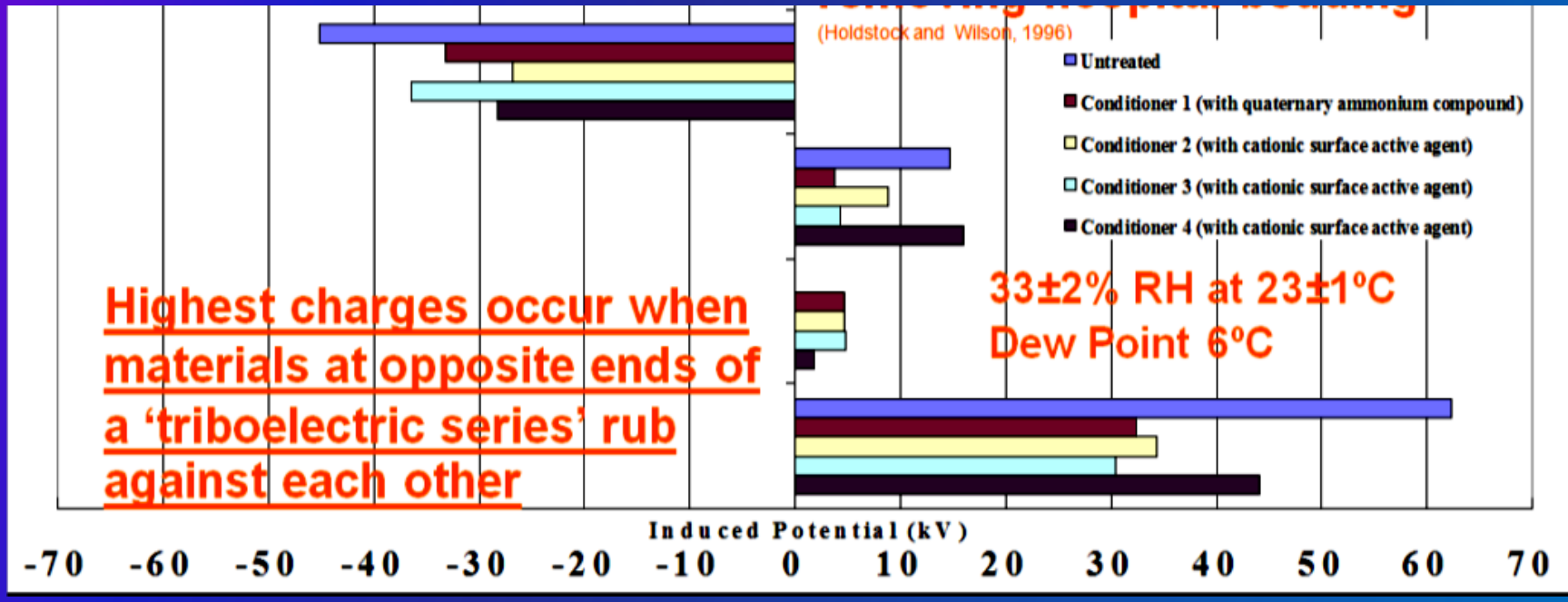


Viruses (also in larger droplet nuclei)	<0.01–0.31 μm
Diesel soot	0.01–1
Bacteria (also in larger droplet nuclei)	0.05–10
Fresh combustion particles	<0.1
Metal fumes	<0.1
Ozone and terpene-formed aerosols	<0.1
Environmental tobacco smoke	0.1–0.8
Fine particles (metals, sulphates)	0.1–2.5
Asbestos	0.25–1
Fungi	0.5–30
Cat dander	1–3
Skin flakes	1–40

Mitigation of *Tribo-electric* charges (can be caused by microwave technology)

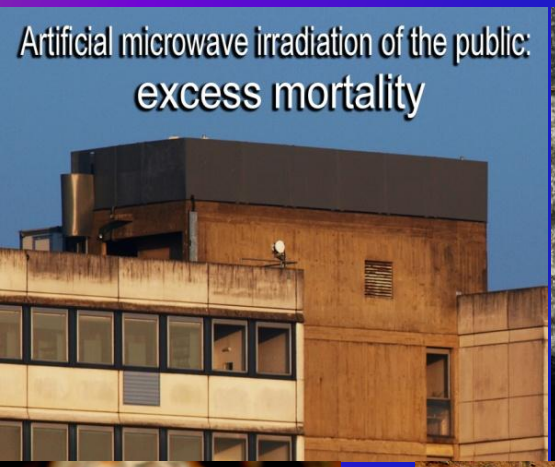
(Hospital & home beddings).

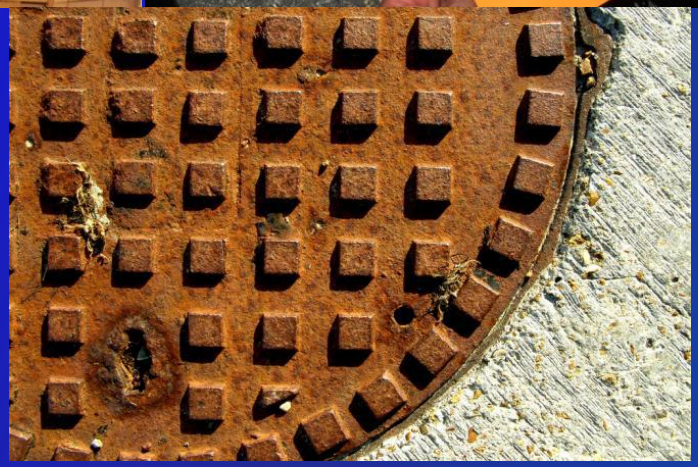
Upper bar: before removal of bedding; **Centre bar:** after **Lower bar:** humidity effects (dew points: 23 & 6°C)



MICROWAVE tech emission levels (nice weather)	**μWatt/cm^2**
Cellphone / tablets @ user	9 – ***3,500***
Cellphones / tablets – background, general population	0.01 - **200**
Microwave oven @ user	**10 – *2,000***
"Cordless" station / Router @ 2 to 6m	7 - **17**
Analog tower (including, WiFi, *light*Radio) urban setting	5 – **25**
Digital tower, urban setting (≅100m)	0.2 - 5
Analog tower, rural 500m	0.25 - **30**
SMART Meter	0.2 – ***625.0***
Local amplification: metallic elements roofing, studs, frames – ceiling, doors, window; grounding**, metal plumbing**, unfilteredtelecom wiring – HV Lines (→***800–1,000*** μWatt/cm^2)	**1 - 4.5 X** powerr

Quantum-leap-accelerated WIRELESS tech Corrosion



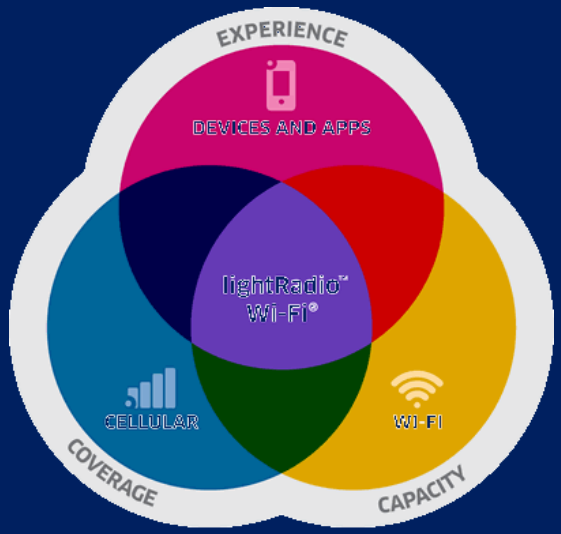


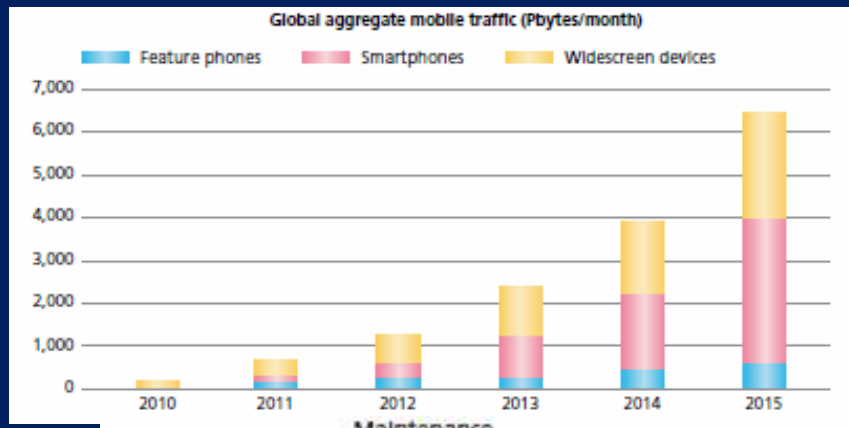
Quantum-leap-accelerated Wireless tech Corrosion - rebar & surface corrosion – cell tower on water tower – Northern France, autumn 2012

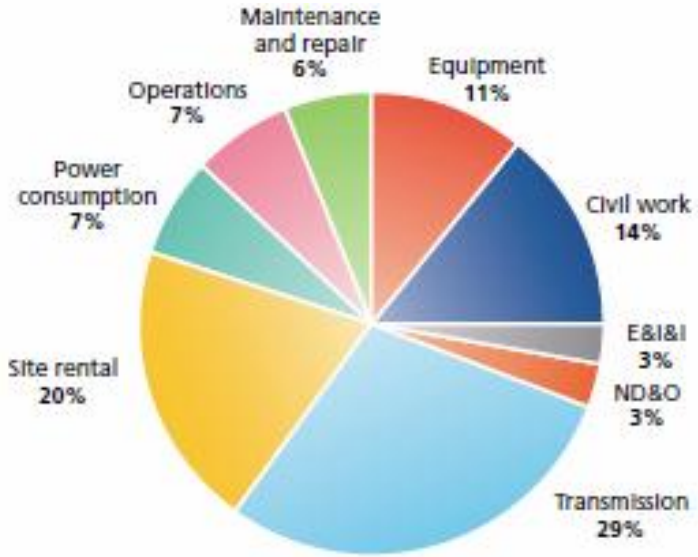
Ottawa Hydro Field Study – December 12, 2013 – "Sources of radiation identified during the inspection were":

- - Hydro Ottawa's 900 MHz smart meters
- - Customer owned 60 Hz supply voltage and unit wiring within the customer units
- - Customer owned 60 Hz supply, end wall wiring and metering center and unit service conductors under the concrete floor
- - Hydro Ottawa primary transformer supply approximately 25 feet from the customer unit
- - Bell Canada telecom infrastructure
- - Bell Canada telecom VDSL Fibe infrastructure
- - Rogers cablevision utility termination
- - Via Rail train line with RF telemetry
- - Ottawa International Airport flight path and resulting RF telemetry and traffic
- - City of Ottawa Itron smart meter water meter module with RF broadcast
- - Adjacent tenants in area having Wi-Fi connection for their broadband signal for their internet
- - Cellular towers for public carriers
- - AM & FM commercial radio and television broadcasts

Trends – lightRadio masts (Wi-Fi) - more data, no regulation, more ground exposure



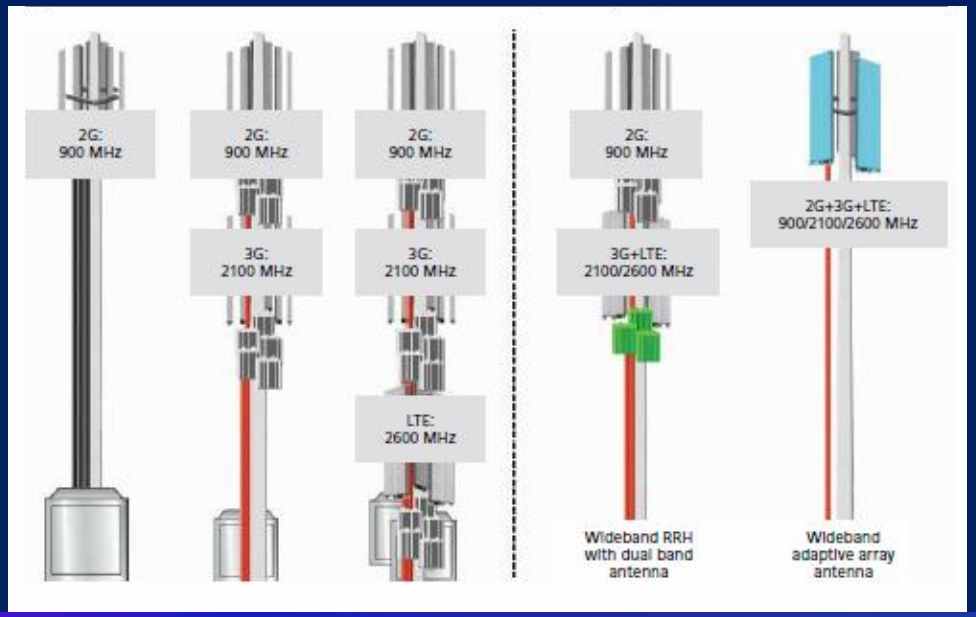




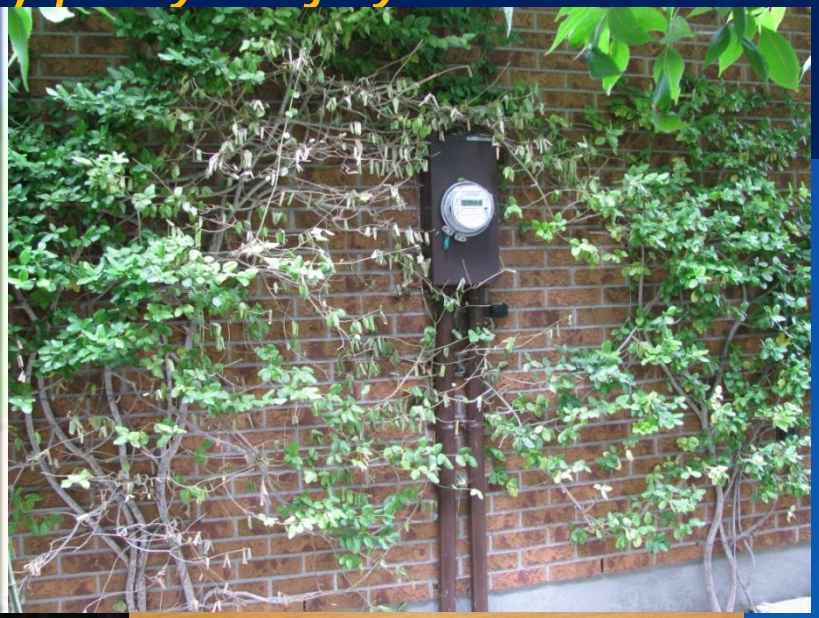
CONFIGURATION		INFRASTRUCTURE AND TECHNOLOGY CAPABILITY	
		BANDWIDTH (MB/S)	LATENCY (MS)
Copper	2 pair bonding with vectoring and phantom mode 1500 m	100 down 20 up	3
	4 pair bonding with vectoring and phantom mode 1500 m	230 down 40 up	3
	8 pair bonding with vectoring and phantom mode 1500 m	750 down, 150 up	3
Microwave	11-23GHz (Up to 16 km at 11 GHz) 254 bits per frame	305 down, 306 up per radio	~0.15 per hop
	80 GHz (up to 1.5km)	1000	~0.15 per hop
Fiber	10 Gb/s point to point fibre	10,000	0.1 + 0.005/km
	CWDM	8 x 10,000 per fiber pair	0.005/km

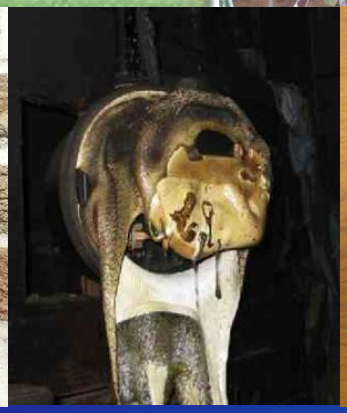
Trends (2):

- Software development in-expertises
- Forcing aging population to adapt to the technology.
- Deregulation with new masts (*light*Radio, etc for LAN)
- Massive electric power consumption by wireless tech



Trends: SMART *meter fire, quality & safety concerns*





Regulations *– actual and emerging*

Those who are most vulnerable to EMF are: pregnant , child, aged, sick and hyper-sensitive populations .

The World Health Organisation (WHO) (2001) the **European Parliament** (2009) and the **European Council** (Resolution 1815) in 2011:

(1 milliGauss / 0.1, eventually 0.03, *micro*Watt/cm^2) further to the ***BioInitative*** have suggested and provided useful information to improve EMF situation.

There are no standards for extremely low frequency fields in Canada.

There is no structure for deciding action or discipline in Canada for electromagnetic fields.

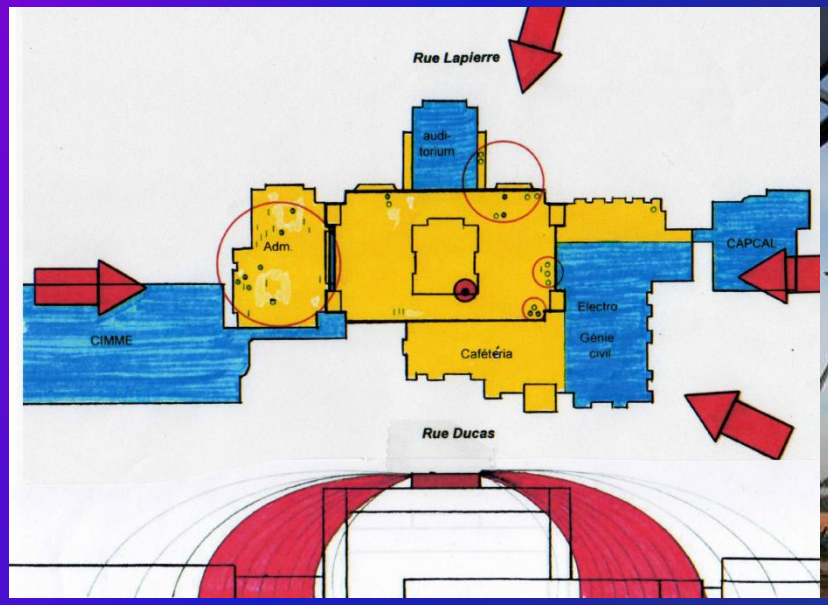
EMF in Canada are among the most elevated in the world

(London-Ottawa-Quebec)

WIRELESS: *building s-*

Cégep Laurendeau roof transmitters. Yellow roofing spots indicated clusters of deceased staffers; Red shows emissions; Blue no adverse outcomes reported below meshed roofs;

US embassy in Baghdad shielded from wireless emissions with meshes.



Shielding from electric power magnetic EMF

(10 -300Hz + harmonics & some pulsations activity ELF +)

- *Mu*Metal sheeting– 2 to 20X + reduction
- Fire door (special 2 hour design) – 2 to 4 X
- Field cancelling systems
- Artificial opposing (loop circuit) field in selected zone
  (3 vectors *X,Y,Z*)

Shielding for MICROWAVE *technology*

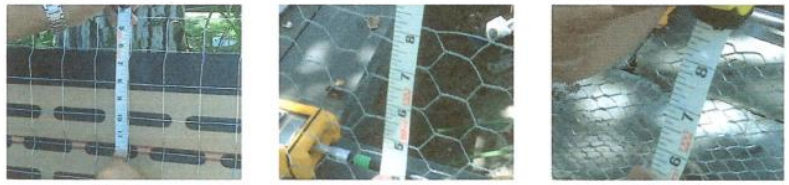


Figure 10-2
Measurement setup to determine the insertion loss presented by a conductive mesh (chicken wire in this case).

Table 10-1
Insertion loss measurement results for three different types of metal lath expressed as a reduction factor (F) and in decibels (dB).

	Panel A lath		Panel B lath		Panel C lath	
Frequency band	F	dB	F	dB	F	dB
900 MHz	2.5	4.1	8.9	9.5	82	19.1
2.4 GHz	1.3	1.2	2.6	4.2	14	11.4

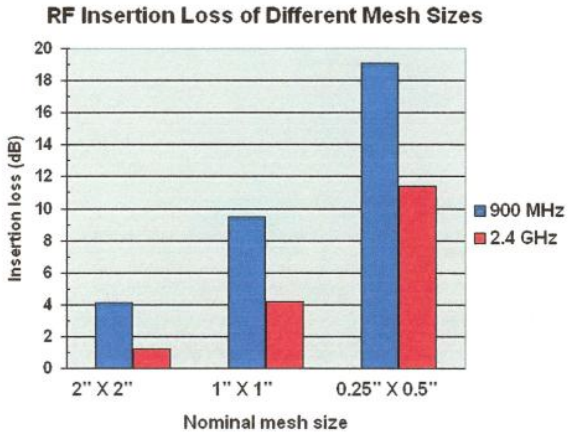
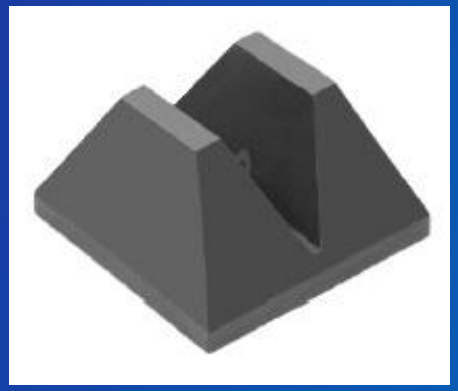
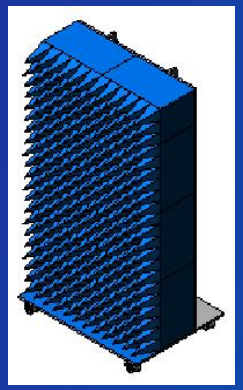


Figure 10-3
Insertion loss of three different metal mesh sizes.





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Workshops / Consulting / Documentation