

Emission Levels of Itron OpenWay® Smart Meter in $\mu\text{W}/\text{m}^2$ (900 MHz antenna)

Distance	20 cm/8 inches	1 m/3 feet	3 m/10 feet
Common peak exposure levels of a single Itron smart meter			
Smart meter, front		ca. 10,000-100,000	outdoor
Smart meter, back		ca. 100-1,000	indoor
Sage Report, CALCULATED for 100% duty cycle			
1000% reflection	98,937,700	6,183,600	556,500
100% reflection	3,270,700	204,400	18,400
60% reflection	2,093,200	130,800	11,800
ACS Compliance Testing Laboratory (RSS-210/FCC15.247), CALCULATED without reflection factor			
900 MHz LAN	2,270,000	[90,000]	[10,000]
2.4 GHz ZigBee	310,000		
Electric Power Research Institute, CALCULATED upper range of possible RF fields			
Peak level	(1,683,600) <small>(30 cm/1 foot)</small>	(187,270)	(16,836)
Itron, Inc. CALCULATED			
Sentinel	810,000		
Centron	680,000		
BC Centre for Disease Control, MEASURED at BC Hydro Laboratory			
Peak level, front	≤ 200,000	≤ 200,000	
Min. detectable level of RF Probe	≤ 200,000		
Richard Tell Associates, Inc. CALCULATED with ground reflection factor 2.56			
Maximum level	100,000 <small>adjacent to meter</small>	10,000	1,000
BC Hydro, as quoted in its Smart Meter Business Case			
	< 100,000		100
Safe Living Technologies (Ontario), MEASURED installed at residence			
Peak level, front		≥ 20,000	
Indoor peak level, back		100-900	
Electric Power Research Institute, MEASURED installed at residence in California (spatial scan)			
Peak level, front	(53,375) <small>(30 cm/1 foot)</small>	(11,346)	
Indoor peak level, back		(610) <small>in bedroom 1 behind meter</small>	(550) <small>In bath and bedroom 2</small>
ET&T (California), MEASURED a single smart meter at residence			
Peak level, front	21,000 <small>(30 cm/1 foot)</small>		
Planetworks Consulting Corp., MEASURED at BC Hydro Laboratory (commissioned by BC Hydro)			
Background level	22,000 <small>(6-min average)</small>		
Smart meter turned on	23,000 <small>(6-min average)</small>	2000-55,000	
E-field probe certified lower limit	ca. 50,000		
BC Hydro, CALCULATED AVERAGE based on transmit time per day			
0.6% duty cycle (8 min)	20,000	[540]	[60]
0.06% duty cycle (1 min)	1600	[60]	[7]

© Feb 2012 Katharina Gustavs

[] Values in square brackets are not listed in the quoted report, but inferred based on the formulas provided.

() Values in round brackets are listed as percentage of the Maximum Permissible Exposure (MPE), 6,100,000 $\mu\text{W}/\text{m}^2$, in the original EPRI report.

Each Itron smart meter installed at a residence contains two antennas: 900 MHz and 2.4 GHz.

In BC, the latter antenna designed for the home area network that communicates with RF-enabled appliances will not be activated by default.

RF Exposure Guidelines for the General Public

USA – FCC Maximum Permissible Exposure at 900 MHz: 6,000,000 $\mu\text{W}/\text{m}^2$ or 600 $\mu\text{W}/\text{cm}^2$

Canada – Safety Code 6 at 900 MHz: 6,000,000 $\mu\text{W}/\text{m}^2$ or 600 $\mu\text{W}/\text{cm}^2$

References

British Columbia Centre for Disease Control (Canada)

Assessment of Radio Frequency (RF) Emissions from BC Hydro Smart Meters (2010)

http://www.bccdc.ca/NR/rdonlyres/43EF885D-8211-4BCF-8FA9-0B34076CE364/0/June92011_BCCDCReport_BCHydroSmartMeters.pdf

BC Hydro (utility of British Columbia, Canada)

Understanding Radio Frequency and BC Hydro's Smart Meters

http://www.bchydro.com/etc/medialib/internet/documents/smi/smi_RadioFrequency_SmartMeters.Par.0001.File.smi-RadioFrequency-SmartMeters.pdf

Smart Metering & Infrastructure Program—Business Case

http://www.bchydro.com/etc/medialib/internet/documents/smi/smi_business_case.Par.0001.File.smi_business_case.pdf

Electric Power Research Institute

An Investigation of Radiofrequency Fields Associated with the Itron Smart Meter (2010)

<http://mydocs.epri.com/docs/CorporateDocuments/Newsletters/ENV/QN-2011-02/07-060c.html>

Radio-Frequency Exposure Levels from Smart Meters: A Case Study of One Model (2011)

http://www.demandresponsesmartgrid.org/Resources/Documents/Reports-Govt-NFP/EPRI_RF%20Exposure%20from%20Smart%20Meters_Summary%20Report_FEB%202011.pdf

Itron, Inc.

Analysis of Biological Hazards from Exposure to Radio Frequency (RF) Radiation (2007)

Itron White Paper

Wireless Transmissions: An Examination of OpenWay Smart Meter Transmissions in a 24-Hour Duty Cycle (2011)

https://www.itron.com/na/PublishedContent/OpenWay%20Wireless%20Transmissions_24%20Hour%20Duty%20Cycle.pdf

OpenWay[®] Radio Frequency and Safety Compliance

Prepared by Itron, Inc. on behalf of BC Hydro

https://www.itron.com/na/resourcesAndSupport/Documents/OpenWay_Radio_Frequency_and_Safety_Compliance.pdf

Planetworks Consulting Corporation (Report commissioned by BC Hydro)

http://www.bchydro.com/energy_in_bc/projects/smart_metering_infrastructure_program/faqs/radio_frequency.html (scroll down to Planetworks)

Single Smart Meter

http://www.bchydro.com/energy_in_bc/projects/smart_metering_infrastructure_program/faqs/radio_frequency.html

Richard Tell Associates, Inc.

An Analysis of Radiofrequency Fields Associated with Operation of the Hydro One Smart Meter System (2010)

http://www.hydroone.com/MyHome/MyAccount/MyMeter/Documents/Smart_Meters_Report_on_RFE.pdf

Sage Associates

Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters (2010)

<http://sagereports.com/smart-meter-rf/>

RF Emission Comparison of Common Household Devices and Smart Meters

Emission Level in $\mu\text{W}/\text{m}^2$	Dis-tance	RF Device/RF Guideline	Type	Exposure Duration
> 10,000,000	10 cm*	Cell phone handset	GSM	During phone call, continuous
6,000,000		Canada Safety Code 6	900 MHz	
4,500,000		ICNIRP Guidelines (1998)	900 MHz	
1,000,000	10 cm*	Cordless phone handset	DECT	During phone call, continuous
200,000	1 m	Leaky microwave oven	2.45 GHz	During use, continuous
10,000-100,000	1 m Outdoor	Itron smart meter, front	Peak 902-928 MHz	Intermittent 1 min/day every 30 min up to 8 min/day every 3-10 s
1,000-100,000	Varies	Cell phone base station		Continuous exposure
1,000-100,000	0.5 m	Wi-Fi router, PC card	2.4 GHz	Continuous exposure
42,500		Swiss Ordinance (2000)	900 MHz	Cell towers in sensitive areas
24,000		Ukraine Safety Guidelines	Radio, TV,	Cell towers in sensitive areas
2,000-20,000	1 m	Cordless phone base station	DECT	Continuous exposure
2,000-20,000	30 cm	RF baby monitor	DECT	During use, continuous
2,000-20,000	1 m	New microwave oven	2.45 GHz	During use, continuous
100-1,000	1 m Indoor	Itron smart meter, back	Peak 902-928 MHz	Intermittent 1 min/day every 30 min up to 8 min/day every 3-10 s
500-1,000	Varies	Health effects observed in populations near cell towers (Kundi 2009) Cardiac effects, headaches, sleep problems		Continuous exposure
1,000		Salzburg Resolution (2000)		
1,000	Outdoor	BiInitiative Report (2007)		
> 1,000	Indoor	"Significant Concern" Building Biology Guidelines for Sleeping Areas (SBM-2008)		
170		Seletun Consensus Statement (2010)		
100	Indoor	BiInitiative Report (2007)		
100		Precautionary reference value for very low radar exposure according to testing specialist Wolfgang Kessel (Germany)		Intermittent exposure Pulse repetition time > 10 s
10-1,000	Indoor	"Severe Concern" Building Biology Guidelines for Sleeping Areas (SBM-2008)		
up to 25		Precautionary reference value for low radar exposure according to Ecolog Institute (Germany)		Intermittent exposure Every ≥ 1 s
10	Outdoor	Salzburg Public Health Department (2002)		
≤ 10	Indoor	Largest number of credit points for indoor environment (TQB 2009)		Green building rating system (Austria)
0.1-10	Indoor	"Slight Concern" Building Biology Guidelines for Sleeping Areas (SBM-2008)		
1	Indoor	Salzburg Public Health Department (2002)		
< 0.1	Indoor	"No Concern" Building Biology Guidelines for Sleeping Areas (SBM-2008)		
0.000 01		Natural background (30 MHz-30 GHz): stormy sun		
0.000 000 01		Natural background (30 MHz-30 GHz): quiet sun		

© Feb 2012 Katharina Gustavs

* Near-field exposure from handsets. All listed exposure guidelines apply to far-field exposure situations.

References

Itron, Inc.

Itron White Paper

Pulsed RF vs. OpenWay[®] Smart Meter Communications

https://www.itron.com/na/PublishedContent/Pulsed_RF_vs%20OpenWay_Smart_Meter_Communications_101173WP-01.pdf

Precautionary Guidelines

BionInitiative Report (2007)

<http://www.bioinitiative.org/report/index.htm>

Building Biology Evaluation Guidelines for Sleeping Areas (SBM-2008)

http://www.baubiologie.de/downloads/english/richtwerte_2008_englisch.pdf

International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines (1998)

<http://www.icnirp.de/documents/emfgdl.pdf>

Salzburg Public Health Department (Austria 2002)

http://www.salzburg.gv.at/konfliktmanagement_salzburger_modell.pdf

Seletun Consensus Statement (2010)

<http://iemfa.org/index.php/publications/seletun-resolution>

TQB Green Building Rating System (Austria 2009)

<https://www.oegnb.net/tqb.htm>

Wolfgang Kessel: Radar – Eine unterschätzte Gefahr. In Elektromagnetische Verträglichkeit Energieversorgung & Mobilfunk. 3rd EMC Conference of the VDB 2004, p. 195.

http://www.baubiologie.net/uploads/media/2004_3_EMV_Themen_Inhalt.pdf

Ecolog Institute <http://www.ecolog-institut.de/index.php?id=42>

Wolfgang Kessel <http://www.cuprotect-shieldingsystems.eu>

Legally Binding Safety Standards

Canada Safety Code 6

http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct-eng.php

Swiss Ordinance on Protection from Non-Ionizing Radiation (NISV 2000)

<http://www.bafu.admin.ch/elektrosmog/01100/01101/index.html?lang=de> or
<http://www.electric-fields.bris.ac.uk/SwissOrdNIR.pdf>

Ukraine Health and Safety Standard (1996)

<http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?page=1&nreg=z0488-96>