The Right to a Healthy Environment: RF Radiation Exposure from Cell Towers

20 May 2015

Presentation by Katharina Gustavs
On behalf of concerned citizens of Cadboro Bay
To Healthy Saanich Advisory Committee

Presentation slides
RF exposure limits and precautionary guidelines
Selected precautionary cell tower policies

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5:30 p.m.

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On behalf of concerned residents of Cadboro Bay

To Healthy Saanich Advisory Committee

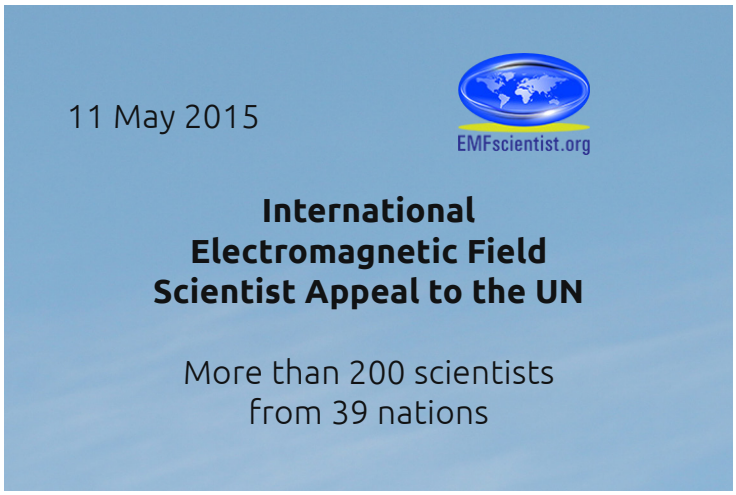
At Saanich Municipal Hall
770 Vernon Avenue Victoria BC

Congratulations to Saanich for joining the Blue Dot Movement and declaring the Right to a Healthy Environment for its residents.

Though a safe electromagnetic environment is not mentioned in the original Declaration, the electromagnetic quality of our environment has a major impact on the well-being of humans, animals, and plants. A safe electromagnetic environment is as essential to human health as healthy food, clean water, and fresh air.

David Suzuki Foundation

Blue Dot Movement

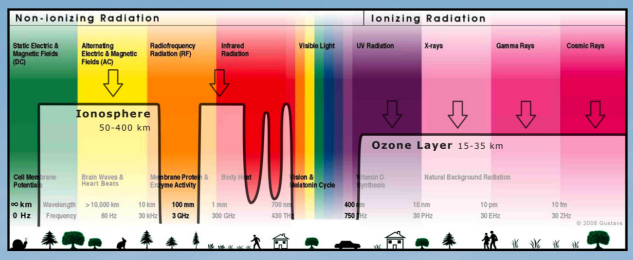


The EMF Scientists **consider nonionizing electromagnetic fields "the fastest growing forms of environmental pollution"** and appeal to all member nations of the United Nations to:

- Protect children and pregnant women from EMF
- Make EMF standards more protective
- Encourage manufacturers to develop safer technology
- Inform the public about the potential health risks from EMF and teach people how to reduce risks
- Establish EMF-free areas

ELF and RF electromagnetic fields should be reclassified as probable carcinogens.

Electromagnetic fields come in many different frequencies.



Radiation effects causing DNA damage can be divided into direct effects due to ionization, hence the name "ionizing radiation," and indrect effects due to the formation of free radical.

Ionizing radiation exposure causes about 1/3 direct effects and 2/3 indirect effects.

Nonionizing radiation cannot ionize molecules--that is, knock off electrons--as ionizing radiation does, but so-called nonthermal effects of nonionizing radiation **can cause the formation of excess free radicals.**

Canada	**10,000,000 µW/m²**
Russia, China, Italy, Toronto	**100,000 µW/m²**
Ukraine	**24,000 µW/m²**
Salzburg Resolution 2000	**1000 µW/m²**
BioInitiative Report 2007	**1000 µW/m²**
Austrian Antenna System Guideline	**1000 µW/m²**
Austrian Sustainable Building Council	**10 µW/m²**
BioInitiative Report 2012	**3-6 µW/m²**
Austrian Medical Association 2012	**1 µW/m²**
Building Biology Guidelines 2015	**0.1 µW/m²**
Natural background	**0.000 001 µW/m²**

Canada has one of the highest RF exposure limits worldwide.

Precautionary guidelines tend to be 10,000 times lower or even lower.

For additional exposure limits and precautionary guidelines as well as links, see the Appendix further below.

Review of 15 Studies on Cell Tower Radiation

MEDICAL UNIVERSITY OF VIENNA

Health symptoms are observed from ***500-1000 µW/m²,***
incl. cardiovascular symptoms, headaches, and sleep problems

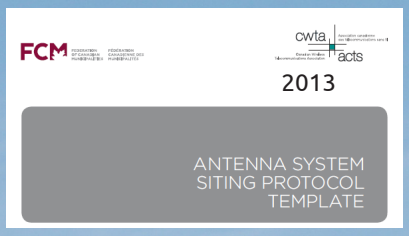
Kundi and Hutter (2009):
Mobile phone base stations—Effects on wellbeing and health

Hutter, Moshammer, and Kundi (2002):
Mobile telephone base-stations: effects on health and wellbeing
>1000 µW/m2
Cardiovascular symptoms highly significant

In this study nobody knew it was a study about cell tower radiation; questions were about a whole range of environmental factors.

EMF levels were measured in 336 households.

FCM and cwta suggest: The municipality does not assess health issues, non-placment issues or non-design related issues.



Why should a municipality not care about the health of its residents? This document recognizes the existence of "community sensitive locations" such as residences and recommends to "maximize the distance from residential areas."

"The Municipality does not asses any submission for an Antenna System with respect to health and radiofrequency exposure issues or any other non-placement or non-design related issues. Any questions or comments the public may wish to make regarding health issues related to cell phones, cell towers and radiofrequency exposure guidelines (Safety Code 6) should be directed to Health Canada on-line at healthcanada.gc.ca and to the Proponent's representative." (Page 5, Footnote 2)

FCM/cwta: Antenna System Siting Protocol

British Columbia Local Government Act 1996

A board may, by bylaw,

(a) regulate and prohibit for the purposes of maintaining, promoting or preserving public health…

B.C. Local Government Act 1996
Division 4: Health

Chateauguay vs. Rogers

Well-being of citizens is a legitimate municipal purpose

City of Chateauguay has the right to designate an alternative location for radiocommunication equipment

Chateauguay – Suburb of Montreal with ca. 46,000 inhabitants

2007 Rogers applies for installation of cell tower
2009 Neighbors concerned about location and signed petition
Notice of land reserve to stop the installation of Rogers' cell antennas
Notice of expropriation to provide alternative location
30 May 2014 Quebec Court of Appeal rules that well-being of citizens is a legitimate municipal purpose
29 January 2015 Supreme Court of Canada granted leave to appeal to Rogers

Chategauguay--COM54 Judgment
McAnsh Law

Industry Canada
June 2014 Amendments
to Antenna Tower Siting Procedures

- Local residents / municipal government at center of siting process
- Cell antennas at any height must go through consultation process
- Municipalities may set their own distance for notification radius

Decision on Amendments to Industry Canada's Antenna Tower Siting Procedures

Notification distance: within a radius of three times the tower height

Cell antennas below 15 m not anymore exempt from consultation process

Macrocell base station
- 5 – 50 W
- Within radius < 50 m: RF exposure levels **lower**

Microcell base station
- 2 – 5 W
- Within radius < 50 m: RF exposure levels **higher**

"**Exposures were generally greater at microcell sites** than at macrocell sites when locations within about 50 m from the antennas were considered."

This study was funded by the UK Department of Trade and Industry.

Cooper et al. (2004): Exposure of the General Public to Radio Waves near Microcell and Picocell Base Stations for Mobile Telecommunications

Cadboro Bay Area on Vancouver Island

Telus microcell installation
Each microcell unit contains two antennas:
HSPA 1900 MHz and LTE 2100 MHz
Maximum power output of each antenna: 5 W

Grandis Place

200,000 µW/m^2 10,000 µW/m^2

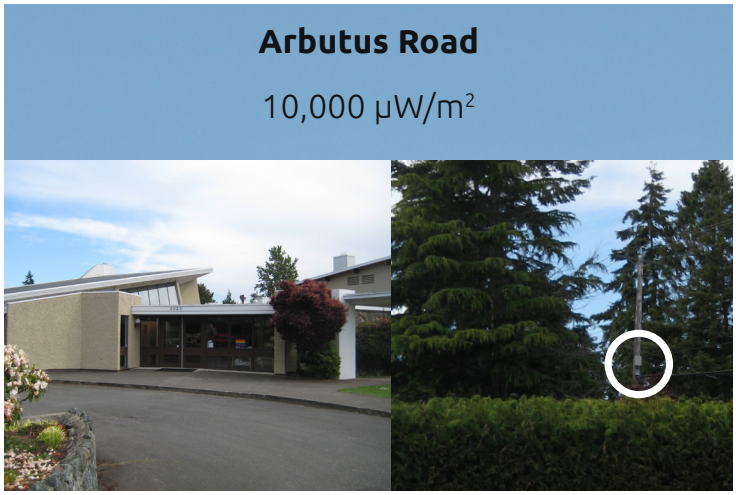
Cadboro Bay Area on Vancouver Island

Telus microcell installation with 33 locations

Spot RF measurements taken with Gigahertz Solutions HFE59B RF meter with ultra-broadband antenna
18 May 2015

Left image: Within 10 m of utility pole
Peak Hold: 20,000 – 30,000 µW/m^2,
With correction factor 10 =
200,000 – 300,000 µW/m^2

Right image: Around basketball hoops
Peak Hold: 1000 – 5000 µW/m^2
With correction factor 10 =
10,000 – 50,000 µW/m^2



Spot RF measurements taken with Gigahertz Solutions HFE59B RF meter with ultra-broadband antenna
18 May 2015

Left image: Measurements taken in front of main entrance of United Church
- Peak Hold: 1000-2000 µW/m2
- With correction factor 10 =
- 10,000 – 20,000 µW/m2

Right image: Microcell unit on Arbutus Road closest to church hall, beam directed toward church

2012/2013 Telus approaches United Church on Arbutus Road about cell tower site

Australia
Communications Alliance Ltd. (industry forum)
Industry Code: Mobile Phone Base Station Deployment
Issued since 2002

Antenna System Siting Guideline—
A Precautionary Approach to Installation, Operation, Retrofitting, and Expanding Fixed Transmitter Sites (2014)
Issued since 2012

Precautionary target threshold level:
<1000 µW/m² sum total of all fixed wireless transmitters inside or outside a building

Applies to sensitive areas where humans spend more than 4 hours per day (e.g. residences, schools, workplaces)

RF measurement protocol of average and peak levels (with broadband RF meter or spectrum analyzer)

Colwood

Communication Antenna Policy 2009

- To minimize exposure to EMR where people live, work or attend school
- Maximum RF threshold level 1000 µW/m^2 from single or combined devices

Colwood's precautionary cell tower siting policy found on pages 435 to 447
CVRD Electoral Area Services Committee meeting on 5 March 2013

City of Langley
BRITISH COLUMBIA, CANADA

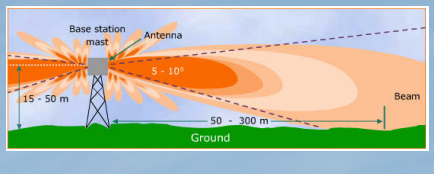
Telecommunication Tower Bylaw 2013

- Cell tower applicant must petition all property owners within 500 m of proposed cell tower site
- Petition process must demonstrate support of at least 80% of those parties petitioned

Township of Langley
Zoning Bylaw 1987 NO. 2055, Amendment (Telecommunication Towers) Bylaw 2013 NO. 5013

Update
Saanich Administrative Policy for Antennas (2009)

- Regardless of **mounting height** of cell antenna, have public consultation process
- Choose a large **notification distance**, e.g. 500 m

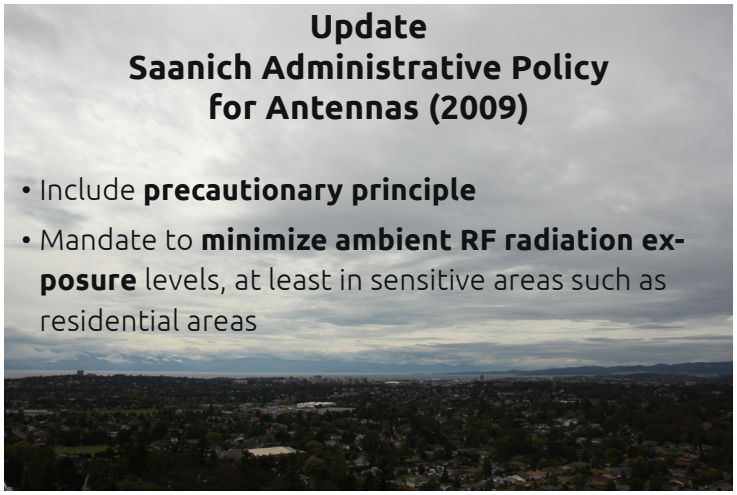


Update the Saanich Administrative Policy for Antennas from 2009 to bring it in line with the latest Industry Canada regulations.

Cell antennas mounted below 15 m are not exempt from the consultation process anymore.

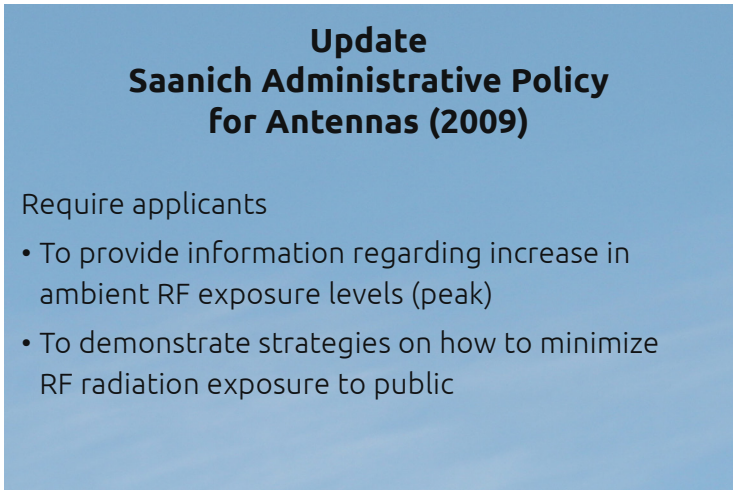
Municipalities are encouraged to choose their own notification distance; the required minimum notification distance is three times the height of the structure the cell antennas are mounted to.

Image: Mobinil beam shape & direction



In cases of scientific uncertainty, the precautionary principle is applied as recommended in the *Canadian Environmental Protection Act.*

Then it also makes sense to follow installation best practices guidelines that minimize the RF radiation exposure to the public. Any reduction in ambient RF radiation exposure levels saves energy. The less energy is put out, the more energy is saved, and the lower the RF exposure to the public will be. A win-win situation.



A wireless service provider should provide detailed maps of what coverage is provided in which areas, showing anticipated average and peak levels of RF radiation exposure levels under different traffic conditions (nighttime vs. late afternoon / early evening).

For ionizing radiation, the ALARA principle has been applied since the 1950s (NCRP 1954).

For nonionizing radiation such as RF radiation, the application of the ALARA principle is now also being recommended.

2011 Council of Europe Parliamentary Assembly Resolution 1815 on The Potential Dangers of Electromagnetic Fields and Their Effect on the Environment

"Reconsider the scientific basis for the present standards on exposure to electromagnetic fields set by the International Commission on Non-Ionising Radiation Protection, which have serious limitations, and apply ALARA principles, covering both thermal effects and the athermic or biological effects of electromagnetic emissions or radiation."

Current RF exposure limits and precautionary guidelines

Please note that official exposure limits are mostly based on scientific studies that demonstrate so-called thermal effects, which are well studied and established.
Precautionary recommendations by scientific, nongovernmental, and environmental organizations also include reported nonthermal effects whose explanations of their "plausible effect mechanisms" are still pending. Throughout this process of scientific knowledge finding to explain the why, various adverse health effects are being observed at much lower levels.

Exposure Levels in $\mu W/m^2$	National and International Exposure Guidelines
1,000,000,000	Cataract formation, established (Steneck 1980) Lens opacity may already occur from 10,000,000 $\mu W/m^2$.
100,000,000	U.S. Standard C95.1-1966 (occupational exposure) The first standard limiting exposure to microwaves in the Western world.
Up to 10,000,000	RF radiation exposure from cell phone handset held next to head
	Canada Safety Code 6 (2015)
10,000,000	1500-15,000 MHz
6,000,000	900 MHz
	ICNIRP International Guidelines (1998)
10,000,000	1500-15,000 MHz
4,500,000	900 MHz
	These guidelines are based on biological effects of short-term, high-level exposures only, also referred to as thermal effects. Germany (1996), USA (1997), Japan (1997), Switzerland (2000), Australia (2002), Finland (2002), Sweden (2002), UK (2004), Austria (2006), etc.
	Belgium Guidelines (2001)
~2,000,000	1900 MHz
~1,000,000	800 MHz
	In 2009 a ruling of the constitutional court concluded that the setting of exposure levels for cell towers lies with the regional not the federal government. See further below.
	India (2012) Exposure limit of cell tower radiation for general public
1,000,000	2-300 GHz
450,000	900 MHz
Up to 1,000,000	RF radiation exposure from cell phone handset at 1 foot
Up to 400,000	DECT cordless phones at 1 foot: 100,000-400,000 $\mu W/m^2$
Up to 200,000	Wi-Fi access points/clients at 8 inches: 100,000-200,000 $\mu W/m^2$
Up to 100,000	In the vicinity of cell towers (400-m radius): 1,000-100,000 $\mu W/m^2$
~100,000 (6 V/m)	China Ministry of Health Standard (1987) Exposure limit for "first grade environment" or sensitive areas
	Toronto Board of Health, Canada (1999/2013) Prudent Avoidance Policy for Siting of Cell Phone Base Stations:
	Russia Ministry of Health Standard SanPin 2.1.8. (2003) Exposure limit for general public
	Italy Decree (2003): Precautionary attention level not to be exceeded in sensitive areas
	Switzerland Ordinance (NISV 2000) Precautionary cell tower exposure limit for sensitive areas
~95,500	1800 MHz
~42,500	900 MHz

~24,000 (3 V/m)	Ukraine Health & Safety Guideline (1996) Regional Ordinances in Brussels (2007), Wallonia (2009), Flanders (2010)
40,000 20,000 20,000	DECT cordless phone at 1 m: 2,000-40,000 µW/m² Wi-Fi router/access point/PC card at 50 cm: 1,000-20,000 µW/m² Standard RF baby monitor at 30 cm: 2,000-20,000 µW/m² Low-emission baby monitor (Germany) at 30 cm: only 35 µW/m²
2 V/m or ~10,000 3,000 1700	ECOLOG Institute in Germany (2000) Precautionary recommendation based on review of scientific literature Emissions from single RF sources (e.g. cell tower) at max. 30% of precautionary limit Seletun Consensus Statement (2010) Precautionary recommendation
500-1,000	Health effects observed in populations near cell towers (Kundi 2009) Cardiac effects, headaches, sleep problems
1,000	Salzburg Resolution on Mobile Telecommunication Base Stations (2000) Precautionary recommendation BioInitiative Working Group (2007) Precautionary recommendation Parliamentary Assembly of Council of Europe (2011) Precautionary recommendation for indoor environments Austrian Antenna System Siting Guideline (2012, 2nd edition 2014) Precautionary target threshold level
100	Working Group of EU STOA Panel (2001) Precautionary recommendation BUND (Friends of the Earth Germany) (2008) Precautionary recommendation for hazard protection Parliamentary Assembly of Council of Europe (2011) Precautionary recommendation for indoor environments for medium-term
10	Health Department of the Federal State of Salzburg (Austria 2002) Precautionary recommendation for outdoor environment (GSM sum total) TQB Green Building Rating System (Austria 2009) Largest number of credit points for indoor environment
3-6	BioInitiative Working Group (2012) Precautionary recommendation
1	Health Department of the Federal State of Salzburg (Austria 2002) Precautionary recommendation for indoor environment (GSM sum total) BUND (Friends of the Earth Germany) (2008) Precautionary recommendation for general protection EMF Working Group of Austrian Medical Association (2012) EMF guidelines for diagnosis and treatment of EMF-related health problems "within normal limits"
0.1	Building Biology Evaluation Guidelines (SBM-2008) "No Concern" Specifically designed for sleeping areas associated with long-term risks
0.001	Minimum power level required for cell phone communication
~0.000 001	Natural background (30 MHz-30 GHz)

0.1 W/m² = 100 mW/m² = 100,000 µW/m² = 10 µW/cm²

May 2015

Cell tower siting policies of B.C. municipalities

Township of Langley 2012

At its Regular Afternoon Meeting of **September 10, 2012**, Council passed the following resolution:

> *"Whereas the Township of Langley has received a growing number of cell tower applications; and*
>
> *Whereas these application are contentious and the final jurisdiction of cell towers is a Federal matter regulated by C.R.T.C.;*
>
> *Therefore be it resolved that the issue of cell tower applications be referred to staff to develop a policy whereby Council requires the applicant to pay for a Township-run petition process whereby the Township shall petition all owners of properties within 500 metres of the proposed cell tower site and which shall stipulate that while Council will consider all applications, it will not forward said cell tower application on to the C.R.T.C. unless and until the petition process demonstrates support of at least 80% of those parties petitioned; and further*
>
> *Be it resolved that cell tower applications presently in stream be put on hold until this new approval threshold and benchmark details has been ratified by Council, if legally feasible."*

Source: Township of Langley Zoning Bylaw 1987 NO. 2055, Amendment (Telecommunication Towers) Bylaw 2013 NO. 5013

City of Colwood 2009

"PURPOSE

To establish a policy governing the placement and/or activation of all telecommunication antenna, transmitters, reiceivers or any EMR-emitting/receiving *devices*, (henceforth called "devices") whether new or replacement on an exisiting or new structure. The purpose of this policy is to minimize exposure to electromagnetic radiation where people live, work or attend school."

"Power output limits

The existing licensed FM transmitters on Triangle Mountain have licenses to broadcast at approximately 100 kw.

All new *devices* in Colwood are restricted to a maximum output of 2 kw, providing the power density from single or combined *devices* does not exceed 0.1 microwatts per square centimeter or the latest federal standard, but only if lower, at the closest residence, school or workplace."

Source: http://www.cvrd.bc.ca/archives/71/March%205,%202013.pdf (pages 439 to 447)

Australia (2011) Issued since 2002
Industry Code—Mobile Phone Base Station Deployment

"1.2 Objectives

The objectives of this Code are:

a) to apply a Precautionary Approach to the deployment of Mobile Phone Radiocommunications infrastructure;
b) to provide best practice processes for demonstrating compliance with relevant exposure limits and the protection of the public;
c) to ensure that the exposure of the community to EMF is minimized;
d) to ensure relevant stakeholders are informed, consulted and engaged with before Mobile Phone Radiocommunications infrastructure Is constructed;
e) to specify standards for consultation, information availability and presentation;
f) to consider the impact on the wellbeing of the community, physical or otherwise, of Mobile Phone Radiocommunications infrastructure; and
g) to ensure Council and community views are incorporated into the Mobile Phone Radiocommunications infrastructure site selection.

Source: http://www.acma.gov.au/webwr/telcomm/industry_codes/codes/c564_2011.pdf (pages 4-5)

Austria (2014) Issued since 2012
Antenna System Siting Guideline—A Precautionary Approach to Installation, Operation, Retrofitting, and Expanding Fixed Transmitter Sites [German: *Leitfaden zur Aufstellung von Mobilfunkmasten: Vorsorgeprinzip bei Errichtung, Betrieb, Um - und Ausbau von ortsfesten Sendeanlagen*]

- Precautionary target threshold level: <1000 µW/m² sum total of all fixed wireless transmitters inside or outside a building
- Applies not only to cell tower emissions (e.g. GSM, UMTS, LTE, etc.) but any fixed wireless transmitter from 100 kHz (e.g. broadcasting, TV, Wi-Fi, TETRA, ham radio, etc.)
- Applies to sensitive areas where humans spend more than 4 hours per day (e.g. residences, schools, workplaces)
- List of scientific studies on nonthermal biological effects
- RF measurement protocol of average and peak levels (with broadband RF meter or spectrum analyzer)

Suggested strategies to minimize cell tower radiation exposure (p. 12)

- Limiting the permissible power output (EIRP)
- Changing the direction of the main beam
- Adjusting the beam width
- Changing the antenna gain
- Changing the beam tilt angle
- Adjusting the mounting height

Stakeholders and contributors:
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