

Calgary



# What is 5G?



**5G** is the next evolution in mobile and wireless technology. It will overlay 4G networks and evolve existing 3G and 4G capabilities, delivering faster connections and greater capacity. 5G has been described as a critical step for building connected, resilient and smart cities that will support technology such as the Internet of Things (IoT) and autonomous vehicles.

Imagine what can be done with a 100x increase in traffic capacity and network efficiency, a 10x decrease in end-to-end latency, and speeds that are over 600 times faster than the typical 4G speeds on today's mobile phones.

Source: Canadian Wireless Telecommunications Association



## Did you know?

- 4G and earlier generations required the use of macro cells to access voice and data services. Unlike previous generations of mobile technology, the successful implementation of 5G - the fifth generation of mobile networks - will require a densified network with significantly more small cells, attached to City and private assets.
- The biggest requirement to support the rollout of this new generation of wireless technology is... wires! Fibre, more specifically. That's right, wireless isn't truly wireless. The majority of those small cells that we expect to see will be connected to fibre, running underground in the new and existing rights-of-way.

## Is 5G technology already out there?

**Yes... but it's still quite scarce.**

5G technology is still mostly in the development phase, but there are [pockets of deployments](#) in a handful of areas across the globe. Roll out will depend on the wireless service providers' investment commitments, which are generally market driven.

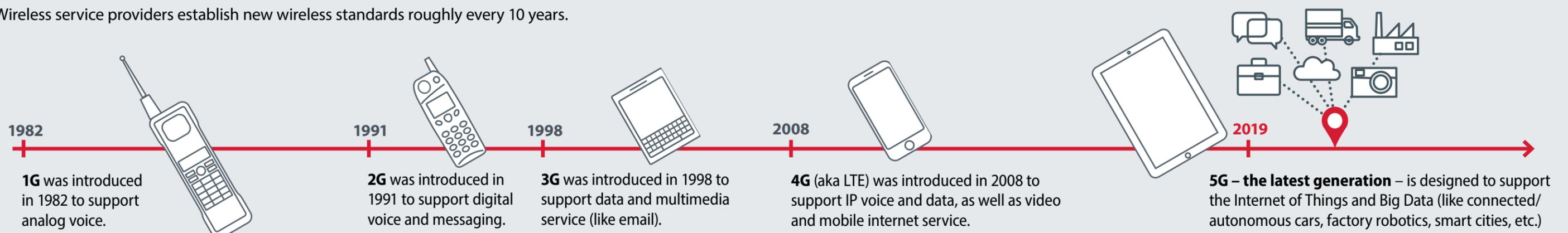
A big factor for the launch of 5G in Canada is related to the necessity for wireless service providers to acquire access to the radio frequency spectrum. The radio frequency spectrum is a unique and finite resource from which all aspects of society benefit. It provides access for Canadians to a range of private,

commercial, consumer, defence, national security, scientific and public safety applications. It is the only resource that can support practical wireless communications in everyday situations.

In order for 5G to make its big debut, the Government of Canada will need to hold additional spectrum auctions; the process used to assign spectrum licenses. Spectrum auctions for 5G began in March 2019 with the 600MHz band. In March 2020, the Government of Canada announced the 3500MHz spectrum band auction is to begin on 2020 December 15. The 3500 MHz band is expected to play a significant role in the development 5G services.

## The evolution

Wireless service providers establish new wireless standards roughly every 10 years.

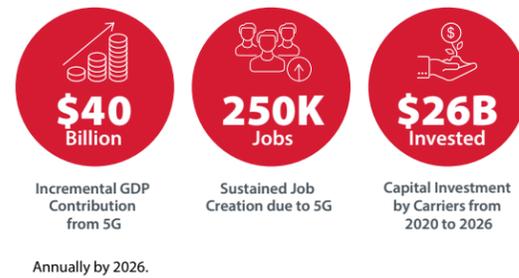


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## 5G's Economic Value

A 2018 report commissioned by the Canadian Wireless Telecommunications Association (CWTA) reported:

### Contribution of 5G to Canadian Economy



Source: [Accenture/Canadian Wireless Telecommunications Association\(CWTA\)](#)

## What is The City's Role in 5G?

To support innovation and remain an attractive place to start or grow a business, The City's role is to provide a streamlined approach for wireless service providers (Rogers, Shaw/Freedom Mobile, TELUS etc.) to make an inquiry about access to City-owned infrastructure for the deployment of wireless infrastructure.

Wireless service providers may search online for City-owned assets (e.g. street lights, buildings, land for macro towers) and submit a site feasibility request. If the site is deemed feasible, they may apply for site access. The City of Calgary reviews and grants access to City-owned assets with a focus on design, location and structural considerations.

In addition, the wireless service providers must abide by all the terms and conditions outlined in [The City of Calgary Telecommunication Antenna Structures Siting Protocols](#). The City has developed standards and guidelines to balance industry needs and the public interest.

The City's review does not assess or evaluate health and radiofrequency exposure. Health concerns relating to [radiofrequency, energy, and safety](#) fall under the national jurisdiction of Health Canada.



## Broadcasting and Telecommunications Legislative Review

Canada's broadcasting and telecommunications legislative framework is also currently being reviewed. On 2020 January 29, the Broadcasting and Telecommunications Legislative Review Panel released its [final report and recommendations](#) to the Honourable Minister of Innovation, Science and Industry and the Honourable Minister of Canadian Heritage. If certain recommendations are adopted by the federal Government of Canada, The City of Calgary's ability to control and manage how wireless service providers access its assets may be impacted.

## Regulatory Responsibilities

While The City of Calgary grants access to City-owned assets, **The City is not the final approving authority** for telecommunications antennas.

Approval comes from the Government of Canada with Innovation, Science and Economic Development Canada (ISED) as the **approving authority** for the development and operation of radiocommunication in Canada, including telecommunications antennas, pursuant to the [Radiocommunication Act](#) and the Radiocommunication and Broadcasting Antenna Systems [procedures](#).

In cases where The City does not support a proposal, it cannot prevent a wireless service provider from ultimately gaining permission from ISED to install a telecommunications antenna even if it may contravene [The City of Calgary Telecommunication Antenna Structures Siting Protocols](#).

## Learning the lingo

*fibre* → The term fibre refers to the cabling that is installed underground in the rights-of-way and connects a wireless service providers' core network to the small cell technology.

*conduit/ducting* → The terms conduit and ducting are often used interchangeably and reference the underground pipe or tube that is used to route and protect a wireless service provider's fibre or cable. The term 'duct bank' refers to a collection of these conduits and may either be directly buried in earth, or encased in concrete. A duct bank allows for easier access for the replacement or repair of damaged cables, without the expense of re-excavating a trench.

*small cell* → refers to a low-powered cellular radio access node that wireless service providers may attach to poles, buildings, etc. to improve cellular network coverage, capacity, speed and user experience. Small cells are, on average, 30 cm by 30 cm and typically have a range of 10 to 500 metres and are generally attached at a height of 4.5 meters to 5.5 meters. Individual Small Cells require power, but do not require a cabinet. In order for the small cell technology to work, it requires fibre (cable) backhaul (underground and overhead) that connects a wireless service providers core network to the small cell technology.

*macro cell* → refers to a high power cellular base station used by wireless service providers to provide cellular network coverage to a large area, ranging from a few kilometres up to tens of kilometres. A macro cell panel is, on average, one to five metres tall. Macro cell base stations have power outputs of typically tens of watts and are found on towers and rooftops. Macro sites are typically shared by more than one wireless service provider which may include multiple antennas, radios, equipment cabinets, support masts/structures, power and fibre (cable) backhaul (underground and overhead) that connects a wireless service providers core network to the small cell technology.

*latency* → The term latency refers to the time it takes for devices to respond to each other over the wireless network. For example, 3G networks had a typical response time of 100 milliseconds, 4G is around 30 milliseconds and **5G will be as fast as one millisecond**.

*IoT* → The term IoT stands for the 'Internet of Things' and refers to the connection of devices and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. IoT examples in the real world include wearables (e.g. smartwatch) and smart homes (e.g. Amazon Echo).

*spectrum* → The term spectrum refers to the electromagnetic waves that travel within a certain band of wavelength. All 5G wireless devices communicate by radio waves, over frequency channels assigned from a common pool of frequencies, which are part of the electromagnetic spectrum. Spectrum is the invisible signal that allows Wireless Service Providers to transmit data across long distances to cellphones and other internet-connected devices. In radio and telecommunications, the frequency spectrum can be shared among many different broadcasters.