Telecom, IoT, 5G

A WIL Digital Initiative

Presented by the Information and Communications Technology Council

Welcome to ICTC's WIL Digital: *Telecom, IoT & 5G*

ICTC's WIL Digital is an innovative Work Integrated Learning (WIL) program that helps students gain insight and skills to advance learning and meaningful work experience.

COURSE OVERVIEW

Welcome to ***"Telecom, IoT & 5G"***. This ICTC course is a great opportunity for participants to learn about one of the most exciting industries today, as well as a source of knowledge for telecom-related technologies and their current impact for companies around the world, with a focus on Canada.

TARGETED AUDIENCE

This course is designed for students who are interested in developing fundamental skills in the subject of telecommunications, 5G, and IoT as an entry-level introduction to these topics. Students who are already proficient in this subject matter are encouraged to explore the other WIL Digital courses available that provide lateral understanding of concepts associated with this course. If you are interested in studying a more in-depth version of this subject, please contact your course facilitator for further options.

Each module will take approximately one to two hours , to be completed during your work placement. We suggest you work on one module per week and take four weeks to complete the case study.

As a participant, you will:

- Have access to six unique, micro-learning modules, supported by industry partners in the telecom ecosystem across Canada.
- Find ways to jumpstart your career in telecommunications, IoT, and 5G.
- Add new skills to your professional portfolio.
- Become the next generation of talent in the telecom landscape.

Good luck and have fun!

ABOUT THIS COURSE

As you will see, there are a total of six modules that cover a range of topics:

Module	Title	Learning objectives
1	Introduction to telecommunications	Analyzing the history of telecommunications, from classic networks to today's technologies.
2	Internet of Things (IoT)	Exploring the technologies for IoT networks, as well as main industrial applications.
3	The 5G opportunity	Understanding the fundamentals behind 5G technologies and their potential.
4	Business applications	Learning from industry cases and telecom-related implementations.
5	Environmental and societal impact of the telecom industry	Exploring the potential environmental and social impact of telecommunications systems.

6	Canadian context and career opportunities	Learning about the main stakeholders and related opportunities for telecom careers in Canada.

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1.1 History of Telecommunications

Definition of telecommunications

CRTC
Canada

[Media description: Official logo for CRTC, with black characters, and a blue and white background. It includes the official logo from the Canadian federal government]

The Canadian Radio-television and Telecommunications Commission (CRTC) defines telecommunications as *"any emission, transmission, or reception of intelligence by any wire, cable, radio, optical, or other electromagnetic system"*.

- CRTC: https://crtc.gc.ca/eng/dcs/glossaryt.htm
- Government of Canada:
- https://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=TELECOMMUNICATION&codom2nd_wet=1#resultrecs
  - Fun fact / instructor's note: The technology behind telecommunications has evolved, but so has the term. Depending on the person, location, or role, you may here it referred to as: Telecommunications;
  - Telecommunication;
  - Telecom; or
  - Telco.

[Media description: A hand from an anonymous white person, handling and old phone with metallic brown details, and a cloudy sky background]

The telecommunications industry has a rich history. The desire to communicate, share stories, and discuss new topics is part of human nature. The introduction of technology has progressively increased communication capabilities, to the point that today we can talk to anyone in the world. This required a succession of evolving technologies that introduced new capabilities for a common end goal: communication.

Let's take an unbiased look at of how telecommunications has impacted people's lives over the last two centuries. These e game-changing technologies are always evolving, but to know where it will go, it makes sense to first look at how it all started.

Regardless of what term is applied, telecommunications refers to any kind of technology that enables us to connect to the internet, an audio network, or other connection platform. You will see in the next sections how broad this definition is, which includes a wide range of networks such as broadband, mobile, and satellite.

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2.2 IoT Networks

Now that we have explored some high-level use cases and design considerations for IoT, it's time to analyze different kinds of IoT networks, which depend on their type of physical range and coverage. This is an important consideration because some applications may require less data but longer distance, while others focus on higher data on account of "recurrent communications". All these technical variables and limitations will help the user choose the correct technology, depending on their project.

[Media description: Picture of the Earth, with interconnected white lights representing networks, and a black sky behind full of little stars]

LpWAN - Low Power Wide Area Networks

- These types of networks were developed as a way to enable inexpensive long-range communication that features a low battery consumption and small size implementation. They work well for applications where small blocks of data are sent at low rates of time, so the sensors' battery-powered activity can last up to 10-15 years. These networks can cover up to 15-20 km, depending on the urban or rural environment and the technology, and the cost of infrastructure is relatively low, which facilitates adoption.
- Typical use cases: Agriculture, IoT Analytics, Worker Safety, etc.
- Key Technologies: Sigfox, LoraWAN, LTE-M, NB-IoT
- Other technologies: There are also regular WANs, which are not based on low power principles and can reach longer distances. However, LpWAN is the standard today because of its versatility and associated low infrastructure cost.

LAN/PAN - Local and Personal Area Networks

> **MAN - Municipal Area Networks**

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3.2 Introduction to 5G: Fundamentals and capabilities

The goal of the 5G mobile generation is to take technology and innovation to the next level. Technically, 5G is working in a way that allows better performance in terms of speed, but this is not the only advantage.

The following video offers an explanation of the impact of 5G from the Government of Canada, via the Minister of Innovation, Science and Economic Development.

Topic: Introduction to 5G telecommunications – *“Everyone is talking about 5G and the future of wireless. But what is it? Why is it important? This short animated video explores how 5G will change the world in ways we can't yet imagine and how Canada's Communications Research Centre is working to help Canada be a leader in 5G”.*

Duration: ~1.5 minutes

Canada
What is 5G?
Watch later
Share
Watch on YouTube

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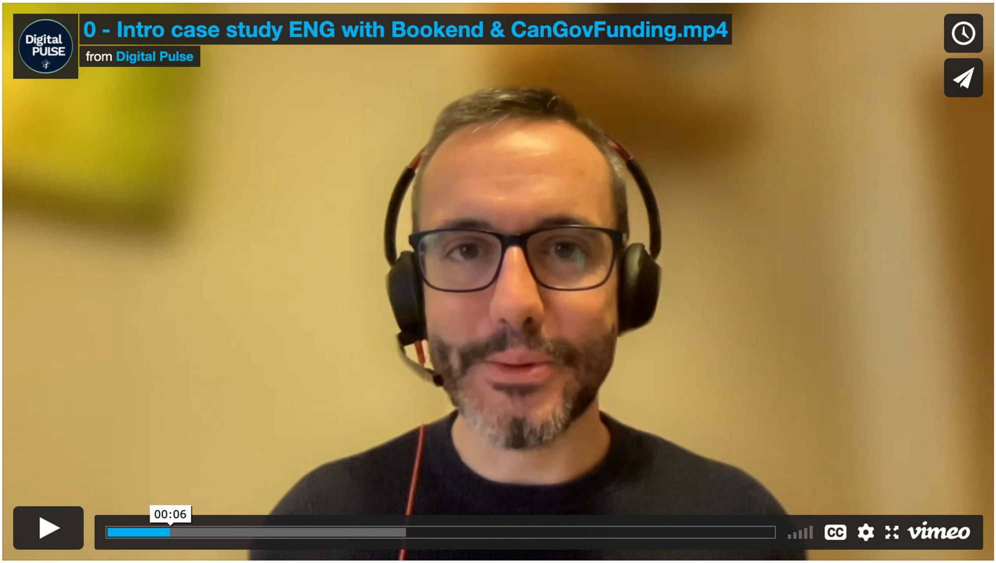
7.0 The Context

Case study introduction video

Duration: 1 min



Transcript:

Welcome back to this class. You have completed already the six modules. We are very happy to have you here. We are very proud of what you have done. Uh, the amount of information you have learned, and now we have a very special activity, a case study that will allow you to apply all the knowledge you have gotten to one specific case. We have someone from the industry coming here to talk to us, explain a current challenge, something that we could find on the industry. And we'll provide you with some frameworks, and steps, for you to solve this challenge. We will share the instructions, but for now explore the case, explore the information, and see you later!

Overview of the company

Founded in 1976, CGI is one of the largest IT and business consulting services firms in the world, and the largest tech firm in Canada. With headquarters in Montreal (initially based in Quebec City), CGI has multiple clients in banking, telecommunications, insurance, manufacturing, public services, healthcare, and other industries. It has more than 80,000 employees in 400 locations worldwide. CGI is quoted on New York and Toronto's stock.

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of Canada | Canada

ICTC is a not-for-profit national centre of expertise for the digital economy, we are the trusted source for evidence-based policy advice,
forward looking research, and creative capacity building programs.