



# CONNECTIVITY GUIDEBOOK

## FOR RURAL ONTARIO:

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CONNECTING AGRICULTURE, BUSINESS, AND TECHNOLOGY

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# ABOUT THIS GUIDEBOOK

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In an increasingly connected world, so many opportunities exist to use technology to drive business development. Sometimes, things progress so quickly it can be difficult to pinpoint what can be done on the ground to fully harness the power of connectivity. This guidebook walks readers through everything from what the Internet is and how to get connected to some of the innovative technologies that can be used on farm that require connectivity. This guidebook is the first step in your journey to getting connected to the Internet. Staff at the County of Wellington are available to direct you to resources as you integrate the Internet and the associated tools and technologies into your farm business.



This guidebook includes hyperlinks to external webpages. Hyperlinks are clickable text that take you to an external website for more information. Keep an eye out for these hyperlinks within the text. If you are reading a paper copy of this guidebook, all the hyperlinks are also provided in full length, as well as a brief description of their location, in **Appendix B**.

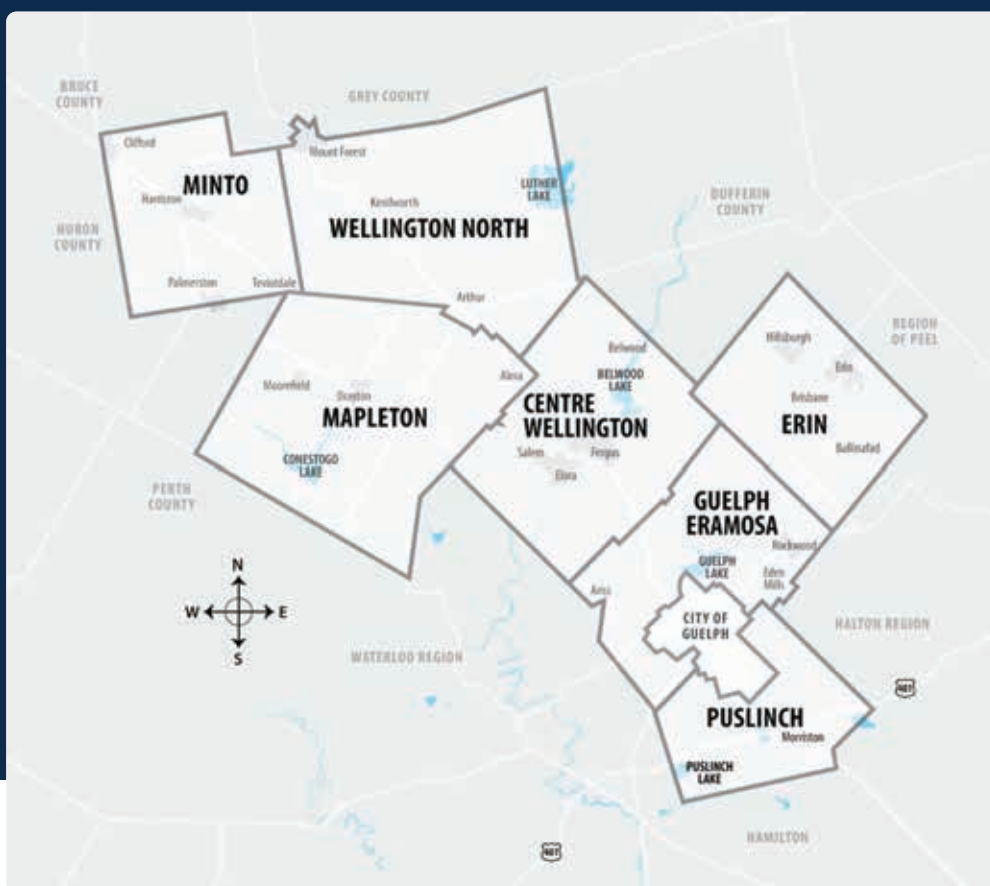


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The County of Wellington is in Southwestern Ontario. The County is comprised of seven member municipalities (see figure 1) and surrounds the City of Guelph. Member municipalities include Centre Wellington, Erin, Guelph Eramosa, Mapleton, Minto, Puslinch and Wellington North. The County of Wellington contains a thriving agricultural sector encompassing 2,348 farms and over 466,400 acres of farmland.<sup>1</sup>

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**Figure 1:** Map of the County of Wellington. Source: County of Wellington Economic Development, 2020

<sup>1</sup> Ontario Ministry of Agriculture, Food and Rural Affairs. (2016). County profile, Wellington County. Retrieved from: [www.omafra.gov.on.ca/english/stats/county/index.html](http://www.omafra.gov.on.ca/english/stats/county/index.html)



# WHY CONNECTIVITY MATTERS

Your farm business can benefit greatly from being connected to the Internet.  
Data-driven technology can help you and your farm:<sup>2, 3, 4</sup>

Maintain beneficial  
environmental  
management practices

Track animal health  
accurately and  
efficiently

Address on-farm  
labour shortages

Stay on top of  
weather patterns

Learn new skills  
and knowledge

Trace food quality  
for consumers with  
greater precision

Share knowledge  
with others

Stay connected to your  
input suppliers and other  
farm service providers

Streamline  
reporting

Pay bills and manage  
your business

Reach new  
customer bases

Access training and  
business sector  
resources

**GETTING CONNECTED TO THE INTERNET TODAY COULD BENEFIT YOUR BUSINESS GREATLY DOWN THE LINE.**

<sup>2</sup> Richardson, D. (1997). The Internet and rural and agricultural development: An integrated approach. Food and Agriculture Organization of the United Nations. [www.fao.org/3/w6840e/w6840e00.htm](http://www.fao.org/3/w6840e/w6840e00.htm)

<sup>3</sup> Duhatschek, P. (2018, Sep. 05). 'Long overdue': Ontario farmers say lack of reliable broadband Internet is hurting their business. CBC News. [www.cbc.ca/news/canada/london/ontario-federation-agriculture-broadband-internet-2019-federal-budget-1.4809934](http://www.cbc.ca/news/canada/london/ontario-federation-agriculture-broadband-internet-2019-federal-budget-1.4809934)

<sup>4</sup> Mehta, A. (2018, Feb. 22). Future farming: Pastures new for big data. Reuters. [www.reutersevents.com/sustainability/future-farming-pastures-new-big-data](http://www.reutersevents.com/sustainability/future-farming-pastures-new-big-data)



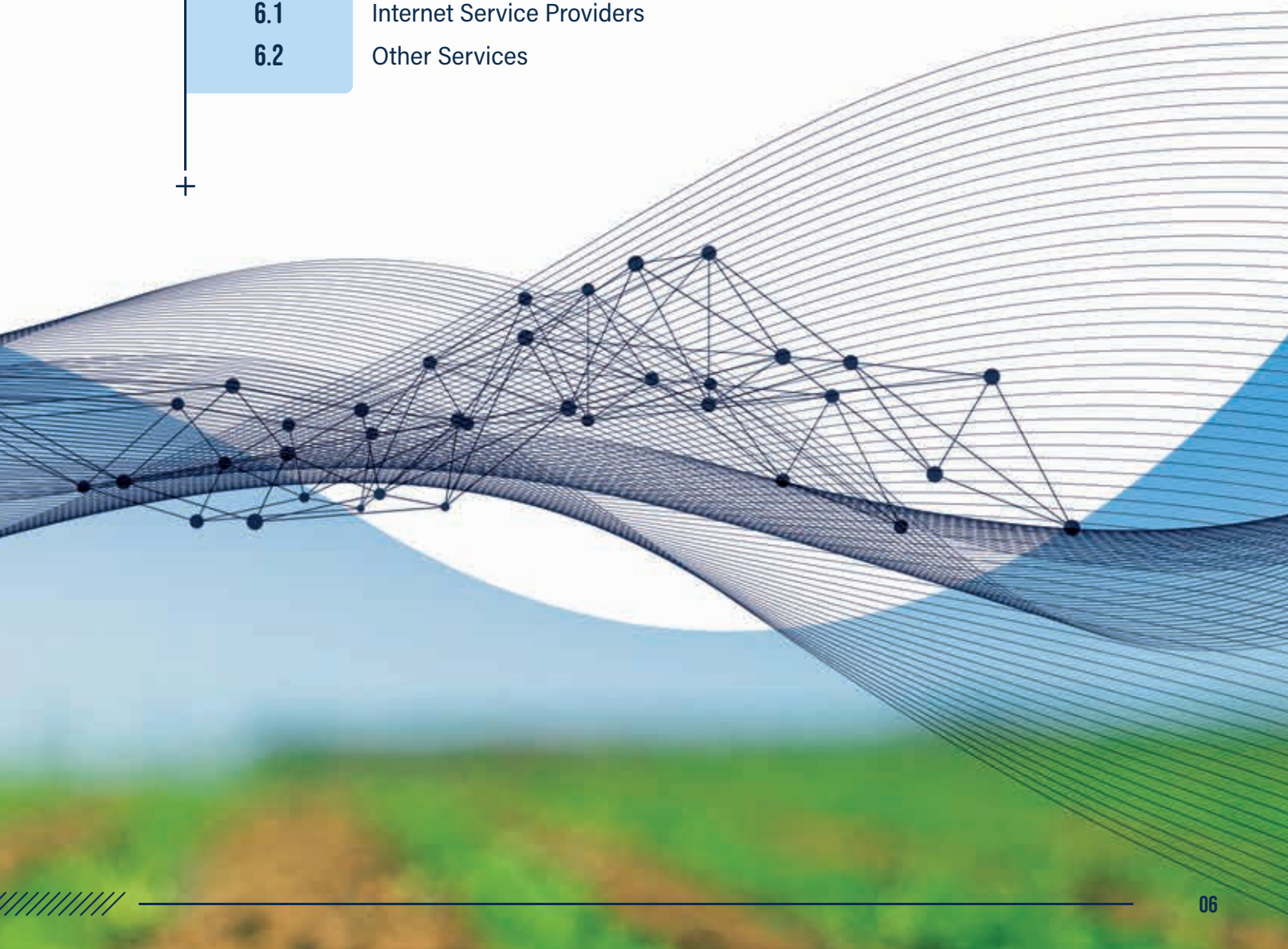
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Farmers and other agricultural business operators throughout Wellington County already use the Internet in many ways to enhance their operations. We profile four such operations below. Throughout this guidebook, look for photos of the farmers to learn how these operations use the Internet and associated technologies. These examples may help illustrate how you can incorporate these types of technologies on your farm.

## WHAT IS TASTE REAL?

Taste Real is a Wellington County local food programme to support local businesses, farms and producers. Participating businesses can benefit from the Local Food brand and their customers that their products are produced in Wellington County. Want to learn more about Taste Real? Visit the Taste Real website at [www.tastereal.ca](http://www.tastereal.ca)

## ROMY SCHILL - CIRCLE R LAMB



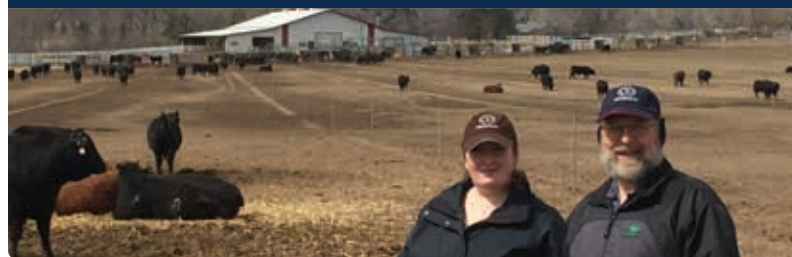
Photo credit: Jodie Aldred Photography

**Technologies highlighted: Marketing website, e-commerce, and video surveillance.**

Circle R Lamb is a lamb farm in Wellington County that has operated for over 12 years. Romy and Ryan are fourth- and fifth-generation farmers who produce sheep, lamb, and wool. They also grow crops for feed, which includes hay and grass forages, corn, wheat, and barley. Romy and Ryan place high priority on their soil and environmental impact, animal care and nutrition, and animal housing. They rely on internet connection for two

components of their business. First, their farm's website [www.circlerlamb.ca](http://www.circlerlamb.ca) is a public-facing site which the couple use to tell people about what they do. The website helps them share their story so the public gains better understanding of where their food and wool products come from. Secondly, Romy and Ryan operate an online store, [www.revolutionwoolco.com](http://www.revolutionwoolco.com). This e-commerce operation sells handmade gifts, yarn, wool, lamb skin, and other products. The pair use both websites to market their sustainable practices to the public, and also promote their businesses through their social media accounts.

## BOB AND KATIE WILSON - GILBREA FARM



**Technologies highlighted: Data aggregation, cloud-based livestock traceability software, RFID sensors, marketing website, and an electronic feeding system.**

For Bob Wilson of Gilbrea Farm in Hillsburgh, the top benefit the Internet and associated technologies brings to his farm is the ability to collect and manipulate data. In 2008, Gilbrea became a Leachman Stabilizer Cooperator. Data is analyzed and evaluated across all cooperator herd animals through an evaluation called Expected Progeny Differences (EPD). The models use information about the animal and its relatives to create a genetic profile. Cooperators use this data as a fundamental determinant in the management of their herds. Bob manages the farm, which includes a seedstock cow-calf operation and a small cash crop operation, with his daughter Katie.



## ELORA RESEARCH STATION



The Ontario Dairy Research Centre, located at the Elora Research Station, was completed in 2015. Photo credit: Richard Seck

### Technologies highlighted: Sensors, robotic milking systems, and weather station data collection.

The Elora Research Station is one of the largest agricultural research farms in Canada, covering 930 hectares of land (ha). The site is home to the Ontario Dairy Research Centre, the Ontario Beef Research Centre – Elora and the Ontario Crops Research Centre – Elora. The research station is designed to support intensive research in crops, soils, beef and dairy.

- The state-of-the-art Ontario Dairy Research Centre is a collaboration among the Agricultural Research Institute of Ontario, Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), the University of Guelph and the Ontario dairy industry.
- The Ontario Beef Research Centre – Elora is the result of a collaboration among the Agricultural Research Institute of Ontario, OMAFRA, the University of Guelph and the Ontario beef industry.

A portion of the station—162 hectares—is dedicated to intensive crop and field-based research, with the balance supporting the beef and dairy research centres (e.g., for feed production and manure disposal). The Elora Research Station uses various technologies such as sensors to collect data and transmit that data across the site. A good internet connection is invaluable to the research and daily operations of the facility. Major crops under study include cereals (corn, wheat and barley), oilseeds (soybeans and canola), edible beans (white and coloured), and forages such as alfalfa.

## PAULA AND DAVE – SALAD DAYS



### Technologies highlighted: E-Commerce, marketing website, and integration between e-commerce and delivery service applications.

Paula and Dave are the owners and operators of Salad Days, a small-scale organic farm located in Belwood, Ontario. Their farm sits on 7.2 acres of land, and they have farmed it since 2015. They use organic farming practices to promote diverse and abundant soil life which helps feed their plants. Paula and Dave aim to provide the community with healthy food while conserving and improving the health of the environment. Salad Days offers a Farm Share subscription that allows customers access to weekly or bi-weekly subscription boxes full of fresh produce. This subscription box can be customized week by week through an online sales platform called Harvie. Paula and Dave rely on a good internet connection to access their sales website [www.saladdaysfarm.ca](http://www.saladdaysfarm.ca) and deliver quality produce for their customers.

# AN INTRODUCTION TO THE INTERNET: HOW DOES IT WORK?

Many of us use the Internet every day without knowing how it really works. The Internet is a network of wires, radios and satellites connecting machines all over the world.<sup>5</sup> The information you access is stored on machines called **servers** connected to this global network. Your computer, phone, tablet, and other devices connect to this network to access this information.

However, your devices are not servers and they do not connect directly to the Internet. This connection requires an account with an **Internet Service Provider (ISP)**; see page 40 for a list of providers in Wellington County.<sup>6</sup>

## GETTING CONNECTED: INTERNET OPTIONS

Several ways exist to connect to an ISP:<sup>7, 8, 9, 10</sup>

- **Dial-up** services connect to the Internet through your main telephone line. You cannot use your phone and internet at the same time with this technology. Dial-up is generally the slowest service commonly available.

- **Digital Subscriber Line** or **DSL** also uses your phone line, but it uses a separate part of it. DSL is faster than dial-up and lets you use your phone and internet at the same time. Older phone lines may need an update to support a DSL connection.
- **Cable Internet** service connects using a regular cable TV line (usually called a “coaxial” cable). Cable internet is usually about as fast as a DSL connection.
- **Satellite Internet** is available through some providers depending on your location. However, satellite internet can be slower than other types of connections due to distance and can be disrupted by weather. New ventures hope to improve speed through low Earth orbit (LEO) satellites, which orbit closer to the earth and minimize the transmission time.
- **Fixed Wireless** allows data communications between two fixed points – like a house and a tower – via radio at each point. Airlink occurs through the air and does not rely on copper or optical fibre transmission. This means that it does not use satellites or telephone services to transmit the internet connection.

<sup>5</sup> Mitra, S. (n.d.). Overview of the Internet. University of Texas. [www.cs.utexas.edu/~mitra/csFall2016/cs329/lectures/webOverview.html](http://www.cs.utexas.edu/~mitra/csFall2016/cs329/lectures/webOverview.html)

<sup>6</sup> Titus, A. [Aaron]. (2009, Feb. 18). How the Internet works in 5 minutes [Video]. YouTube. [www.youtube.com/watch?v=7\\_LPdtKXPc](http://www.youtube.com/watch?v=7_LPdtKXPc)

<sup>7</sup> Xfinity. (2017). Which type of Internet connection is right for you? Comcast. [www.xfinity.com/hub/internet/internet-connections](http://www.xfinity.com/hub/internet/internet-connections)



Speeds can vary based on the type of radios used (3G, LTE, 5G) as well as distance, and can sometimes be disrupted by foliage or weather.

- **Mobile hotspots/Cellular Modems and Wireless Internet** are becoming more common for internet access. These services are provided by your cellular phone companies. They will provide you with a small device that sends signals to cellphone towers to let your computer and other devices connect to the Internet. Like Fixed Wireless, these connection speeds can vary based on foliage or weather. In many cases, speeds can be improved by using specialized antennas, or signal boosters.
- **Fibre** or **fibre-optic** connections use cables with a core of incredibly thin strands of glass or plastic known as optical fibers. This cable allows information to be sent using encoded light rather than relying on electric signals or sounds, making transmission much faster. This kind of cable also requires less insulation from extreme temperatures and is less vulnerable to electromagnetic disruption. While fibre tends to be a future-proofed choice, it is very expensive to run to every address and is not yet available along many rural roads.

- **5G** is a term used to describe innovations known as the “fifth generation of wireless communications”. 5G infrastructure improves on connectivity, latency and bandwidth, but requires close proximity to towers.<sup>11</sup> 5G is still in its early stages, and LTE/4G (fourth-generation wireless communications) are still more prevalent across the region.



**NOTE:** Your ability to connect to wireless internet options such as Fixed Wireless, Modem Hotspots and 5G, will depend on many factors. These factors include your proximity to a signal tower, the construction composition of the tower or buildings around you, as well as the topography of your area. For more information on what type of connection is available, contact the ISPs in your area. For more information on which ISPs are available, please see **Part 6** of this Guidebook.

<sup>8</sup> Plug Things In. (n.d.). What is DSL? Plug Things In. [www.plugthingsin.com/internet/dsl](http://www.plugthingsin.com/internet/dsl)

<sup>9</sup> CanFibe. (2018, Apr. 23). DSL, fiber, satellite, dial-up: What's the difference between internet connections? CanFibe. [www.canfibe.com/dsl-fiber-satellite-dial-up-whats-the-difference-between-internet-connections](http://www.canfibe.com/dsl-fiber-satellite-dial-up-whats-the-difference-between-internet-connections)

<sup>10</sup> Nadel, B. (2019, Mar. 11). Everything you need to know about mobile hotspots. Gear Patrol. [www.gearpatrol.com/tech/a555121/best-mobile-hotspots](http://www.gearpatrol.com/tech/a555121/best-mobile-hotspots)

<sup>11</sup> Government of Canada. What is 5G? Retrieved from: [www.ic.gc.ca/eic/site/069.nsf/eng/00077.html](http://www.ic.gc.ca/eic/site/069.nsf/eng/00077.html)



The following table outlines common internet options, their costs, speeds, availability, and reliability.

 OPTION	COST PER MONTH	SPEED	AVAILABILITY	RELIABILITY
<b>Dial-up</b>	\$5.95	0.01 – 0.056 Mbps <i>(megabits/second)</i>	 Somewhat available	 Not very reliable
<b>DSL</b>	\$25 – \$35	5 – 35 Mbps	 Widely available	 Reliable
<b>Cable</b>	\$50 – \$90	10 – 500 Mbps	 Only available in select locations	 Very reliable
<b>Satellite</b>	\$59.99 – \$150	10 – 100 Mbps	 Widely available	 Very reliable
<b>Fixed Wireless</b>	\$39.99 – \$109.99	10 – 50 Mbps	 Somewhat available	 Reliable
<b>Mobile Hotspot/ Cellular Modems</b>	\$10.00 up to 100 MB, \$20/2GB after	5 – 12 Mbps	 Widely available	 Average reliability
<b>Fibre-Optic</b>	\$80 – \$150	50 mbs – 1.5 Gbs <i>(gigabits/second)</i>	 Only available in select locations	 Very reliable

Figures current as of January 2021.



**NOTE:** The speed and reliability of the connectivity options presented above are approximate. Speed and reliability will vary depending on several factors. For more information about troubleshooting your connectivity speed and reliability, please refer to **Part 4** of this Guidebook.





## ROMY SCHILL – CIRCLE R LAMB

When Romy realized one of her neighbours served as a “base” for an ISP’s fixed wireless system, she reached out to her neighbour and their provider for more information. A representative from the company installed the necessary hardware on her farm; this ISP uses a terrestrial microwave platform, rather than satellites or telephone services. Romy considers herself “lucky” with her internet service, as she knows other farmers struggle with accessing sufficient coverage.

## WHAT ARE ROUTERS AND MODEMS?

Home internet connections usually use two pieces of equipment: modems and routers. A **modem** connects your home to the Internet at a single point. This modem translates digital information into electronic signals which travel along phone or cable lines. A **router** directs internet traffic within your home among your personal devices to make sure information goes where it should. Some connection methods—like mobile hotspots and some modern DSL/cable lines—combine these two pieces of equipment into one.



THE INTERNET



MODEM

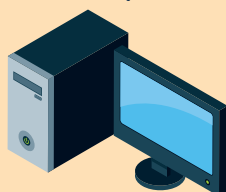


ROUTER

YOUR HOME/FARM



LAPTOP



COMPUTER



CELL PHONE



FARM TECHNOLOGY

Figure 2: How a modem and router help you connect to the Internet.

## GETTING ONLINE IN YOUR HOME

An Internet Service Provider (ISP) connects your home to the Internet, just as power lines hook your home up to the electrical grid. However, you still need to connect your devices to your main connection, just like having your appliances plugged into an electrical socket. Two common ways exist to connect devices to your home's main modem or router.

An **Ethernet** cable connects your computer or another device directly to your router to access the Internet.<sup>12</sup> Ethernet connections are a direct way of connecting and they can provide very fast service. These cables are great for connecting a small number of devices – most routers will have a few plug-in ports – and they are handy for desktop computers that stay in one place in your home.



**Figure 3:** An Ethernet cable. Source: Pixabay

**Wi-Fi** wirelessly connects your laptop, phone, tablet, or other devices to your router, like radio waves being picked up by your car. You may find this connection option more convenient since it does not require a wire. Since Wi-Fi signals travel outside your home, Wi-Fi networks are often protected by passwords to ensure that only trusted people use your network.



**Figure 4:** A standard Wi-Fi-enabled router. Source: Wikimedia Commons

A single Wi-Fi connection can connect several devices to your router. However, Wi-Fi may be slower than an ethernet connection, especially when several devices are using the same connection. Thick walls or certain materials can sometimes reduce your signal reception, and distance is limited.

You can use Ethernet and Wi-Fi connections at the same time to connect different devices to your home network. The setup that works best for you will depend on your home and business needs and physical space.

<sup>12</sup> LinkSys. (2020). What is Ethernet? Belkin International, Inc. [www.linksys.com/us/r/resource-center/basics/whats-ethernet](http://www.linksys.com/us/r/resource-center/basics/whats-ethernet)





# TESTING YOUR CONNECTION

Once you are connected to the Internet, you can test your connection speed online. Wellington County has an **Internet Performance Test website**. This test will tell you your upload speed, download speed, and latency, which are all used to measure internet service quality.

**Upload speed** is how fast you can send information to the Internet. If you want to submit a form for your business or share a photo with a friend, your upload speed determines how quickly this activity can happen.

**Download speed** is how fast you can receive information from the Internet. This information includes webpages that you want to access or videos you want to watch online. Upload speed and download speed are usually measured in **megabits per second** (Mbps).

## WHAT IS A BIT?

A **bit** is a unit used to measure digital information, and a bit is either a zero or a one—that's all. Megabits are used as the standard to understand the speed of your internet, usually by how many can be downloaded or uploaded per second (Mbps). A **byte** is a set of 8 bits. On your computer, a single letter or number on the screen requires 1 byte of storage space. A full-length, high-definition movie is roughly 4 gigabytes. File sizes are usually measured in bytes.


**VALUE**
**EQUAL TO...**
**Bit (b)**
**Byte (B)**

A set of 8 Bits

**Kilobyte (KB)**

1,000 bytes

**Megabyte (MB)**

1,000 kilobytes

**Gigabyte (GB)**

1,000 megabytes



## ACTIVITY

## OPTIMAL DOWNLOAD SPEED

## OPTIMAL UPLOAD SPEED

### Online Audio Call

0.5 Mbps

0.5 Mbps

### Online Video Call

2-4 Mbps

3 Mbps

### Streaming Music

320 Kbps

N/A

### Streaming a Movie (HD)

5 Mbps

N/A

### Running an E-commerce Platform

50-75 Mbps

5 Mbps

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When measuring your upload and download speeds, a higher rate means faster service. 25 Mbps is a faster download speed than 15 Mbps. Internet plans usually offer a download speed which is faster than your upload speed, since historically most houses downloaded more than they uploaded. However, we now know that sharing your screen during videoconferencing meetings for work or school also requires a good upload speed. If what you are seeing on your screen freezes, then your download speed is slow; if the people you're chatting with tell you that you're frozen, then your upload speed is struggling. We also know that these speeds refer to one user on one device. So, if you have multiple devices trying to download and upload different things at the same time, you will have slower speeds.

**Latency** is how much delay your internet connection has in doing the things you want it to do. Latency is measured in milliseconds, and a higher latency means it will take your internet connection longer to get things done. Satellite connections sometimes have higher latency than broadband internet connection because information needs to travel longer distances (into space and back to Earth).<sup>13</sup>

<sup>13</sup> DISH Network. (2020). Guide to getting rural internet in the country. DISH Network. [www.dish.com/availability/rural/rural-internet-guide](http://www.dish.com/availability/rural/rural-internet-guide)



Your internet connection may not be as strong or reliable as you would like it to be. On a farm property, it may be tough to get your house or barn connected to the Internet or to get service to all parts of your property. However, these problems can sometimes be solved.

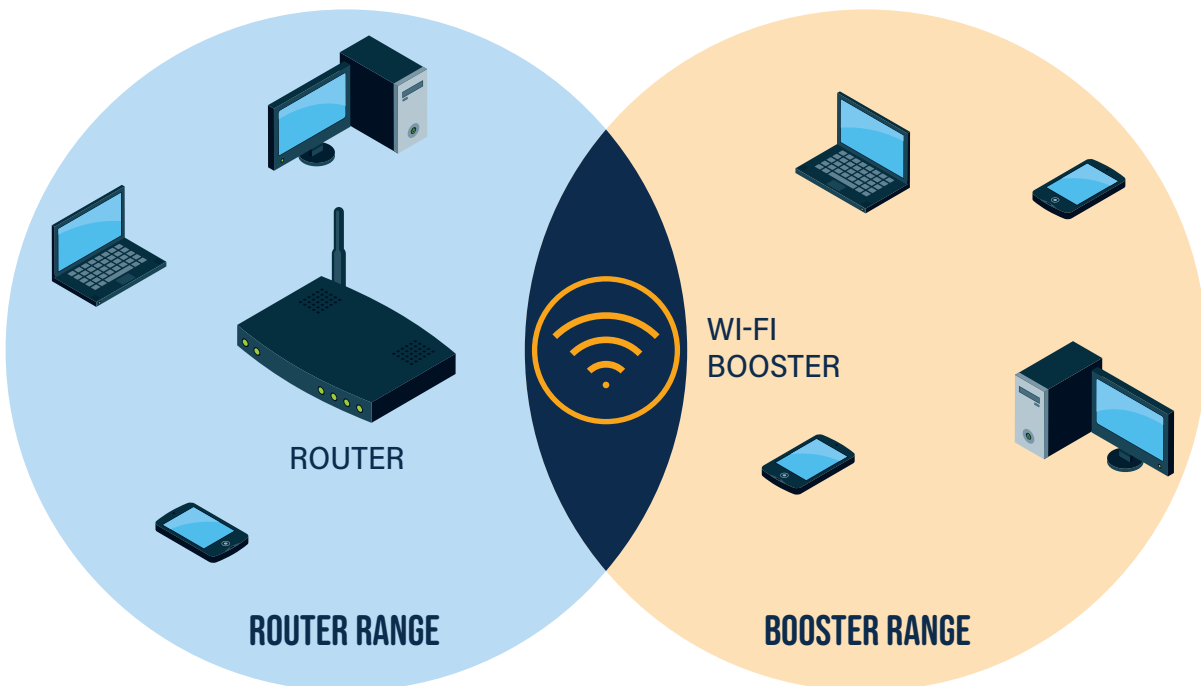
### + WI-FI BOOSTERS/RANGE EXTENDERS

You may have succeeded in getting an internet connection in your home, but you may be struggling to get a signal in one part of your house. You may also have a drive shed, barn, or workshop close to your house where you would like to access the Internet.

Wi-Fi boosters (also known as repeaters or extenders) can help solve this problem. Boosters repeat the signal but with a higher strength. This tool can work well in many cases but can also sometimes cause interference and add latency to the connection (as all your signals get repeated by the booster).

Another option is to install another Wi-Fi Router in your secondary location and connect it back to your house using a wired or wireless point-to-point connection. These options are discussed further in the next two sections.

Your router may cover a large portion of your house, but its signal can only reach so far. A Wi-Fi booster sits near the edge of your router's range and picks up the signal to send it further.<sup>14</sup>



**Figure 5:** How a Wi-Fi booster extends your router's range.

<sup>14</sup> Crane, K. (n.d.). Do Wi-Fi boosters really work? Crutchfield.ca.  
[www.crutchfield.ca/S-dfi0ttDdZ5Z/learn/do-wi-fi-boosters-work.html](http://www.crutchfield.ca/S-dfi0ttDdZ5Z/learn/do-wi-fi-boosters-work.html)

With a booster, you can connect devices in areas of your home that your router can't normally reach.

## CHOOSING THE MODEL AND SET-UP

You first want to decide whether you want to choose a compact model that plugs directly into a power socket, or a larger model that will need to sit on a shelf or desk. Plug-in models are the most convenient, however larger models offer additional features such as ethernet ports for additional wired connections. One of the most commonly recommended boosters, for its effectiveness, price, and set-up, is the **TP-Link RE650**. TP-Link has its own, easy-to-use app that walks you through the set-up process.

When starting the set-up process, you will want to plug your booster in as close to your router as possible. This placement is only for the set-up phase. After you complete the set up, you can move the booster to your desired room. Modern routers and extenders have a WPS (Wi-Fi Protected Set-up) button, which creates a temporary communication channel for the two devices to connect to each other without needing your Wi-Fi password. This is the easiest way to set up your booster. You can then use the booster's app to finish the process.

If your booster does not have a WPS option, you will use the booster's app to set it up. Download your booster's app from your phone or computer's app store. Before launching the app, you will want to connect to the booster's signal via your network settings on your device. Then, launch the booster's app, and complete the set-up process.

If you are unable to access the booster's app via cellphone, you can access the set-up through your computer.

Finally, naming your booster's signal is an important step in the process. Many boosters, like the TP-link,

will automatically change the name of the booster's signal to the name of your router's signal, with the addition of \_EXT at the end. You can change this, but it is recommended that the name you choose be distinguishable from your router's signal. You may need to manually switch between the two signals on your device when you wish to use your booster's signal instead of the signal coming from your router, or when you troubleshoot connectivity issues.

**Troubleshooting:** If you use a Wi-Fi booster/extender, you should be aware of the following:

- The range of the booster/extender you are using. Some come with as little as 100 feet of range, whereas others can come with thousands of feet of range.
- Ensure that the booster/extender is within the range of your router.
- Ensure your booster/extender is plugged into a live power outlet.
- Check to see which connection your device is using: the booster's signal, or your router.



### PAULA AND DAVE – SALAD DAYS

Paula and Dave sell their Salad Days products through farm shares, local markets and to some wholesale buyers. The pair rely on their email and phone to connect with their customers, so a strong internet connection is important. Paula and Dave are extending their internet across their farm to their new pack shed using an ethernet cable after experiencing difficulties using Wi-Fi boosters. To do this work, they had a category 5 (outdoor quality) ethernet cable buried when their electrician ran electrical to the new building. The pair then finished the Internet installation themselves.

## LONG-RANGE WI-FI ANTENNAE

Your house may have internet service, but a barn, shop or drive shed further away on your property might not. You can sometimes send your signal to another router using a long-range antenna.<sup>15</sup> This antenna can carry a signal up to a few kilometres away, but it usually requires a clear path and line of sight for the signal to travel.

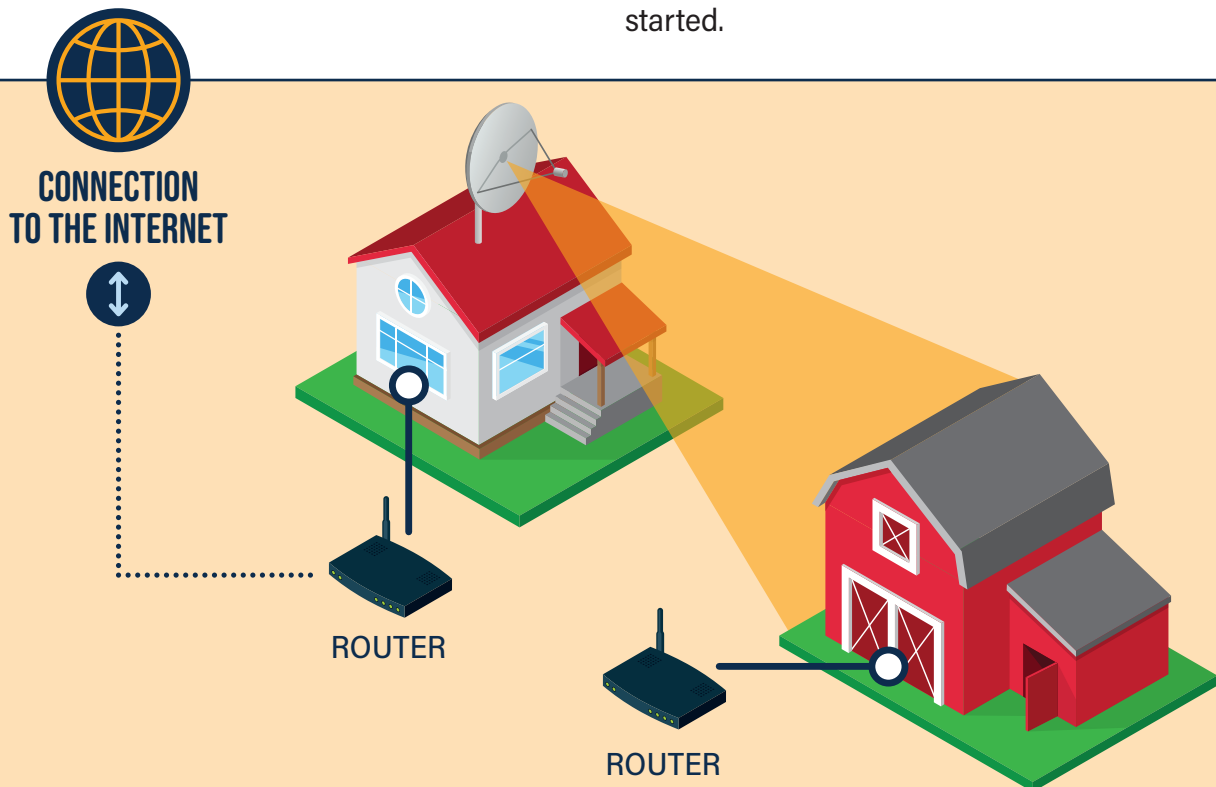
**Troubleshooting:** If you are using a long-range wi-fi antenna, the following may slow down your connection:

- Metal barns or drive sheds
- Inclement weather
- Summer leaf growth

Ensure you have a clear path between routers to help maintain a steady signal. If you are having signal interference, check the path that your signal takes from antenna to router. This process may require some trial and error. If you need help setting up your long-range antenna, you should contact the manufacturer for support.

## INFORMAL NETWORKS AND TECHNICAL SERVICES

Sometimes a connectivity solution depends on additional equipment or a custom arrangement with neighbours. If you don't have a local service provider who can offer you the package you want right out of the box, it might be possible to create an informal network or boosted signal area yourself. These options require more technical knowledge and the willingness to pursue your own permits and contracts, but the points below can help you get started.



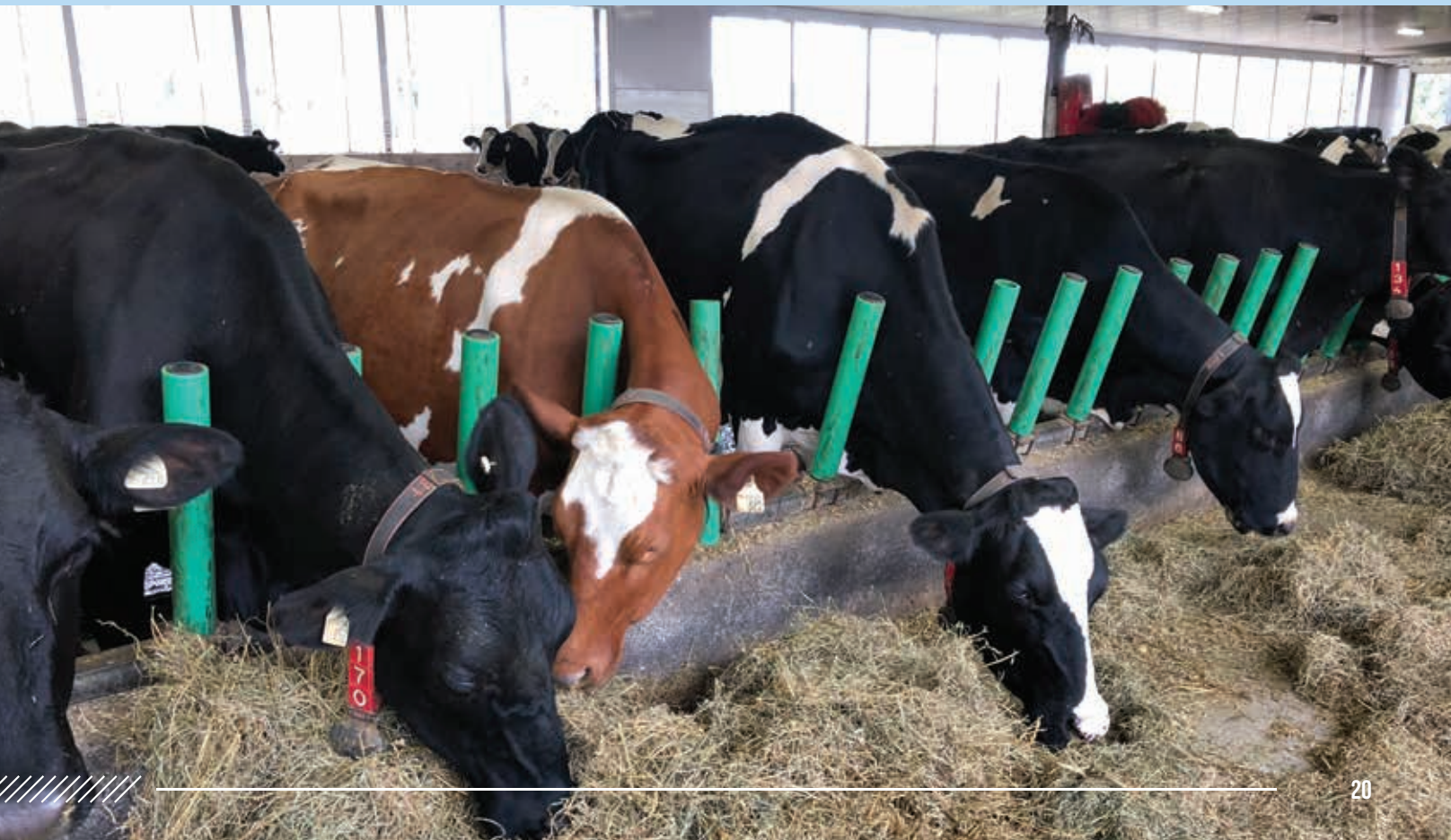
**Figure 6:** How a long-range Wi-Fi antenna works.

<sup>15</sup> Smith, B. (2019, May 26). 7 different types of Wi-Fi antennas (Wi-Fi antenna guide). Internet Access Guide. [www.internet-access-guide.com/how-to-choose-a-wifi-antenna](http://www.internet-access-guide.com/how-to-choose-a-wifi-antenna)



## POINTS TO CONSIDER:

- **It takes a village.** Your neighbours may struggle with the same connectivity issues you face. Internet service providers are more likely to run lines or towers to serve a road with multiple future subscribers than they are to build a connection to serve a single residence. Pursuing service expansion will be more successful if residents lobby together. You can also contact the County of Wellington ([www.wellington.ca/internet](http://www.wellington.ca/internet)) to report the need for expanded service; the County 'maps the gaps' and continuously advocates to local ISPs.
- **Line of sight, lines on poles, or lines in the ground?** If you need to extend your signal out to your field, barn, or other building, you will need to plan your installation method. Many farms take advantage of the height of their silos, installing an antenna on the top to extend their private Wi-Fi network to all corners of their land. You can also hang lines on poles or trench them across fields or ditches.
- **The DIY approach.** Some rural residents decide to take the entire matter into their own hands, going beyond mere boosting and extension equipment. It is possible to hire someone to install towers or fibre for you, and negotiate connection fees to the nearest provider. Because this route is expensive, some people choose to organize local co-ops in order to share the service and divide the financial burden. Often these co-ops connect to a single fibre line and then distribute the signal through a network of wireless boosters, forming what is known as a WISP (Wireless Internet Service Provider).





# ON-FARM TECHNOLOGIES AND CONNECTIVITY

You may be familiar with using your internet connection to search business websites, news and information on your website browser and “googling” queries. However, being connected can also provide business possibilities. These possibilities include simple solutions for common tasks, methods for keeping better records, and highly innovative designs to improve your production.

Before you begin using these software tools, you will need to ask about size and speed requirements. The size – measured in bytes (KB, or MB) – indicates how much memory space it takes up on your device. The speed – measured in Mbps – will affect how efficiently the programmes run on your computer when you are sending or receiving information. If you are using cloud-based programmes, it will be important to have consistent upload speeds to ensure your information can be sent to the cloud. If you are unsure about how to check your download/upload speed, refer to **Part 3** of this guidebook. If your software is not running quickly or efficiently, reach out to your ISP or software provider’s customer service to determine whether your upload/download speed is fast enough to run the programme.







## TECHNOLOGY TO SUPPORT EXISTING FARM BUSINESS FUNCTIONS

Several types of software can improve how you run your business. Below are some examples of how you can use new computer programmes and phone applications to increase efficiency, precision, and communication on your farm.



**Software** refers to programmes and applications that you use on your computer, tablet, or phone.

**Hardware** means the physical pieces of technology, like your keyboard, mouse, screen, or tablet.





## BUSINESS MANAGEMENT SOFTWARE

Specialized business software for farms helps you manage the activities that keep you operating and track your bottom line. Farm Credit Canada's AgExpert Field is one example. Two forms of this software are available:

### Basic:

- Cost: \$0.
- Enables you to map fields, record farm activities, track production costs, plan crop rotations, manage storage locations, and track inventory.
- Accessible from multiple devices.

### Premium:

- Cost: \$399/year.
- Includes all basic features.
- Includes additional features like reports on crop insurance, profitability, and sustainability.

\*As of January 2021

## FINANCIAL SOFTWARE

New software can help you to manage your books with less work and less repetition. With the Internet, you can send invoices instantly, track incomes and expenses, and complete your taxes online. Farmers can select between several brands of financial software. Three popular options are: AgExpert Accounting, QuickBooks and Sage.

Farm Credit Canada offers its AgExpert Accounting software which is designed specifically for farm businesses. This software is available in two forms:

### Basic:

- Cost: \$0.
- Enables you to manage things like balance sheets, accounts payable/receivable, tax returns, and capital assets.
- Accessible from multiple devices.

### Premium:


- Cost: \$399/year.
- Includes all basic features.
- Includes additional features like payroll, cash flows, budgets, invoices, and inventory.

\*As of January 2021



For \$499/year, you can get a bundle with **AgExpert Accounting** and **AgExpert Field** management software.

Turning to **QuickBooks**, this software is available in two forms:<sup>16</sup>

 <b>QUICKBOOKS PRO*</b>	<b>QUICKBOOKS ONLINE*</b>
Requires a one-time purchase (\$399.99), but you must re-purchase when program is updated (about every 3 years).	Requires an ongoing subscription (plans available starting at \$40/month).
Keeps your information on your local computer.	Stores your data in the online "cloud" so you can access it from any device.
Enables you to manage assets, produce tax reports for your accountant, and track bills and payments in one place.	Offers many of the same services as QuickBooks Pro.

\*As of January 2021

**Sage** offers accounting and finance software for small businesses. Typically, farmers use Sage 50cloud. Users can select between three plans.<sup>17</sup>

Sage 50cloud plan options:

	<b>PRO ACCOUNTING PLAN</b>	<b>PREMIUM ACCOUNTING PLAN</b>	<b>QUANTUM ACCOUNTING PLAN</b>
<b>Product highlights</b>	Allows users to manage invoices, income, expenses, and payments.	Product offerings included in the Pro Accounting plan plus inventory management options, and advanced budgeting tools.	Product offerings included in the Premium Accounting plan plus accommodates up to five users and offers the ability to manage multiple companies.
<b>Cost</b>	\$54.25/month	\$77.00/month	Starts at \$343.00/month

\*Prices effective as of January 2021.

<sup>16</sup> Quickbooks. Pricing Comparison: [www.quickbooks.intuit.com/ca/accounting-software](http://www.quickbooks.intuit.com/ca/accounting-software)

<sup>17</sup> Sage. Sage 50cloud Pricing Plans. Retrieved from Sage: [www.sage.com/en-ca/products/sage-50cloud/pricing](http://www.sage.com/en-ca/products/sage-50cloud/pricing)

## WEBSITES AND E-COMMERCE

Farmers that offer direct-to-consumer products increasingly offer online shopping opportunities for their customers. The use of e-commerce platforms for online sales can simplify the direct farm marketing process and virtual farmgate sales. Salad Days, for example, uses Harvie. Open Food Network, Shopify and Local Line are other examples of platforms that help farmers sell directly to consumers. These platforms often have e-commerce, inventory, and logistics capabilities.

Do you want to have your own website? You can use platforms that help you build a website on pre-made templates or you can hire a local company to build a website for you. Adding e-commerce to a website will help you with the sales transactions, but you will also need to market your products and get the word out to drive customers to your website.



### ROMY SCHILL – CIRCLE R LAMB

Romy wants you to know that building your website can take a lot of effort. It is not easy to learn how to build a website, but platforms like **Square** ([www.squareup.com](http://www.squareup.com)) payment system have templates and a payment system that can make the task easier than starting from scratch.

Do you want to learn if e-commerce could be right for your farm? Check out these resources:

- **E-commerce for Ag Businesses: Advantages and Challenges**
- **A Guide to Direct Sales to Consumers During COVID-19 and Beyond**
- **Direct Farm Marketing Business Resources**
- **Online marketing and the basics of direct to consumer sales**
- **E-commerce basics: 3 keys to online sales success**





## PAULA AND DAVE – SALAD DAYS

Interested in building your online presence and potentially an online store? Paula and Dave want you to know it is an investment in terms of time and money. Most e-commerce options take a portion of each sale. The upside? Paula and Dave say that what you spend to improve your customer experience can pay for itself over time through customer satisfaction and retention. Indeed, most community shared agriculture (CSA) consumers have come to expect online stores.

Given the high demand for local food delivery, Paula and Dave's CSA membership grew by 33% from 2019-2020. The couple use a programme called Harvie to help manage their membership fees, track orders, and sell excess products through their virtual farm stand. The Harvie application even integrates with a delivery-based application called RoadWarrior, which optimizes delivery routes to save time and minimize costs.

If you are considering starting a website for your farm operation, you must consider a few factors. An article from **Business News Daily** outlines the following steps for setting up a business website:

1. Determine the primary purpose of your website.
2. Decide on your domain name.
3. Choose a web host.
4. Build your web pages.
5. Set up your payment system (if applicable).
6. Publish your website.
7. Maintain your website.

For more detailed information on starting a website, and what considerations you should make, visit the **Business Development Bank of Canada's website**.



To learn more about local business supports, marketing classes and training opportunities, subscribe to Wellington County In Business News emails at **[www.wellington.ca](http://www.wellington.ca)**

## ADVANCED FARM TECHNOLOGY

Manufacturers and tinkerers are creating appliances and sensors that can connect to the Internet to share data they collect. **The Internet of Things (IoT)** is the idea that we could create networks of devices that regularly gather data on how a business or system runs. While these possibilities are still under development, farm businesses may be able to use this technology to track humidity and temperature in barns or to assess soil, plant, and or livestock health.<sup>18</sup>



### ELORA RESEARCH STATION

At the Ontario Dairy Research Centre at the Elora Research Station, researchers undertake studies to support the province's dairy industry and benefit consumers. For example, one project focuses on individualized feeding strategies for dairy cows in robotic milking systems. Precision feeding programmes, targeted to meet the needs of each cow, will help to ensure the health and welfare of the overall herd, and optimize milk production.

#### DID YOU KNOW?

The Research Station Data Access Portal makes it easier for researchers to access data generated at the Ontario Dairy Research Centre and Ontario Beef Research Centre – Elora. This project not only facilitates researcher access to relevant data but also ensures data is consolidated, archived and made available for future studies.

Thirty-nine sensors send unique, animal-specific data points (including those that track feed consumption and milk yield) from the beef and dairy research centres to U of G servers. Data is made available to researchers through a secure online portal. Researchers only see data related to their projects.

#### REFERENCES

Ontario Agri-Food Innovation Alliance. Ontario Dairy Research Centre at the Elora Research Station. Retrieved from [www.uoguelph.ca/alliance/research-facilities/elora-dairy](http://www.uoguelph.ca/alliance/research-facilities/elora-dairy)

Ontario Agri-Food Innovation Alliance. Current Research at the Ontario Dairy Research Centre. Retrieved from [www.uoguelph.ca/alliance/research-facilities/research-stations/animal-research-facilities/ontario-dairy-research-centre](http://www.uoguelph.ca/alliance/research-facilities/research-stations/animal-research-facilities/ontario-dairy-research-centre)

<sup>18</sup> HackerFarm. (2019). Internet of things...so what? A farmer's guide to technology. [www.hackerfarm.jp/2019/03/internet-of-things-so-what-a-farmers-guide-to-technology](http://www.hackerfarm.jp/2019/03/internet-of-things-so-what-a-farmers-guide-to-technology)



## DATA AGGREGATION SERVICES

As part of the Internet of Things (IoT) movement, and a more general trend toward data collection and commodification, many large corporations are providing data aggregation services to help farmers gain actionable insights from their farm data information. These data aggregation services can offer many mapping and report features, including tracking ground conditions, access to farm health through vegetation index, and providing soil moisture maps. These programmes may also be referred to as Agronomy Software, Farm Management Software, Mapping Software, or Field Information Management Software. This data aggregation is offered through partnerships with providers of these features. Some of the service providers in Canada are:

- AgLeader – SMS and AgFiniti
- Climate FieldView
- Farmers Business
- Granular
- John Deere
- Telus Agriculture

## DRONE DATA FOR AGRICULTURE

Drone services have been adapted to help farmers map their fields and collect data that can be used to create a vegetation index to easily illustrate the growth and health of crops across a farm. Other layers to the maps include data on crop inputs, pesticide use, and yields. These services can inform your decision making about replanting and targeted nutrient applications. These services are often provided by a third-party Unmanned Aerial Vehicle (UAV) service provider. Examples of these providers are:

- **Ag Business & Crop Inc (Palmerston, ON)**
- **Airborne Recon Canada (Hamilton, ON)**
- **Deveron UAS (Toronto, ON)**
- **Drone Services Canada (Hamilton, ON)**
- **Rise UAV (Oro-Medonte, ON)**

Before agreeing to a service's terms, you should seek competitive prices from alternative providers. Also, make sure to ask questions about how the information will be provided to you to ensure you can use the collected data to its full extent.





## VIDEO MONITORING SYSTEMS

Livestock and poultry operations can benefit from new video monitoring systems on the farm. Some solutions don't even need access to high-speed internet at the barn in order to work effectively – these videos can stream right to a television with an antenna. High-quality video monitoring systems can:

- Help you monitor livestock that are calving and lambing to prevent fatalities
- Help you monitor livestock during stressful weather events
- Improve your general farm security
- Provide peace of mind



### ROMY SCHILL – CIRCLE R LAMB

Romy uses video surveillance in her barns so she can check on the flock any time of day. The programme is especially useful during lambing, so she doesn't need to disturb or excite the flock by entering the barn to check in. The surveillance system allows her to give the flock some space, which Romy believes is a good practice for animal care.

## GPS AND AUTOSTEER TECHNOLOGIES

Autosteer or Real-Time Kinematic (RTK) technologies have become increasingly popular as more reasonably priced systems have emerged over the past ten years. Autosteer technology uses satellite and cellular-based positioning equipment

(GPS) to guide agricultural vehicles. Three levels of automation exist for this type of technology<sup>19</sup>:

- **Navigation aids:** Commonly known as lightbars, or parallel tracking devices, navigation aids are a relatively inexpensive way operators can visualize their position with respect to previous passes.
- **Auto Guidance:** Auto guidance options automatically steer the vehicle using either an integrated electro-hydraulic control system or a mechanical steering device installed inside the cab. Traditionally, the operator takes control during turns and other maneuvers, and simply oversees equipment performance when auto-guidance mode is on when driving straight lines. Newer equipment from providers like John Deere and Trimble can now turn the equipment for you, avoiding the need for the operator to take control during turns.
- **Field Robots:** Fully autonomous vehicles do not require the operator's presence on board. Rather, the operation is controlled remotely. A major drawback to these types of technologies is their inability to respond to unpredictable field conditions. This technology is not yet widely available commercially.

GPS, Autosteer and RTK are available throughout Wellington County on a variety of platforms including John Deere and Trimble equipment. If you cannot get RTK service on your farm, please contact the Economic Development office so that we can work with the RTK service providers.

<sup>19</sup> Institute of Agriculture and Natural Resources(nd) Satellite Guidance: Satellite-Based Auto Guidance. University of Nebraska – Lincoln, Crop Watch. [www.cropwatch.unl.edu/ssm/guidance](http://www.cropwatch.unl.edu/ssm/guidance)

# ELORA RESEARCH STATION

The Agriculture and Forest Meteorology Group, School of Environmental Sciences, University of Guelph collaborates with Environment and Climate Change Canada on the maintenance of an automatic weather station at the Elora Research Station. This weather station collects a range of climatic data, including temperature, rainfall and amount of sunshine. Researchers use this data to contextualize the results of their field trials. Increasingly, farmers rely on climatic data – whether

from on-farm weather stations, local weather stations or platforms like Climate Fieldview – to make production decisions.

## REFERENCE:

Scholars Portal Dataverse. Elora Research Station Meteorological Records Dataverse (University of Guelph). Retrieved from [dataverse.scholarsportal.info/dataset.xhtml?persistentId=doi:10.5683/SP/RQRDSH](https://dataverse.scholarsportal.info/dataset.xhtml?persistentId=doi:10.5683/SP/RQRDSH)

## PART 5.3

# ADVANCED FARM CONNECTIVITY

How do you get all these devices to connect to one another and build an Internet of Things if your internet connection isn't perfect? Every farm's setup will be unique, but here are some common ways these complicated networks can be designed to talk to one another when they aren't wired together.

## LORAWAN

Low-Power, Wide-Area Networks (LPWAN) allows the transfer of information between devices at a low cost, and so can help connect IoT devices. LPWAN transfers data periodically to or from devices across significant distances. For example, with an LPWAN, a small low-powered soil testing sensor does not require big bandwidth or speed to send its message to the home station. Because data is only transferred periodically and can be passed along a chain of devices in a network, you can span a large distance between base and sensor. LoRaWAN is

an open standard protocol version of LPWAN; both networks optimize battery lifetime, data transfer capacity, range, and cost.<sup>20</sup>

LoRaWAN can benefit the farm in many ways, including applications such as:<sup>21</sup>

- Cattle monitoring: Better monitor animal conditions, location and prevent loss or theft of livestock
- Environment monitoring: Accurately record rainfall or watch flood risk alarms in real time without manually checking the field
- Farm asset management: Oversee storage conditions, and receive alerts on gates and equipment
- Irrigation control: Schedule and apply the right amount of water to crops
- Soil health: Monitor soil quality from surface to roots, compare different areas of the field, and analyze historical patterns

<sup>20</sup> Actility (nd). LoRaWAN: Global standard for Low Power Wide Area IoT Networks. [www.actility.com/what-is-lorawan](https://www.actility.com/what-is-lorawan)

<sup>21</sup> LoRa Alliance (ND) Smart Agriculture. [www.lora-alliance.org/lorawan-vertical-markets/agriculture](https://www.lora-alliance.org/lorawan-vertical-markets/agriculture)

## EDGE COMPUTING

Often we talk about software running from “the cloud”, which is an internet-hosted storage space. But what if your connection to the cloud can’t move data back and forth fast enough to keep up in real time? Edge computing collects all the local data and keeps it functioning and useful to you while waiting for your cloud connection to catch up. Your network of devices can send information to an edge processor, or “gateway”, which then reports up to the cloud-hosted software as possible. You get convenience without full connectivity.



### BOB AND KATIE WILSON – GILBREA FARM

Bob and Katie tag each calf with an RFID (radio frequency identification) tag at birth. This tag helps the father-daughter duo track each animal over the course of its life. For example, an RFID reader is connected to their weight scale head, which allows the Wilsons to quickly weigh each animal and track its weight gain over time.

Bob and Katie also use an electronic feeding system to monitor the amount of feed each animal eats. Paired with the data from the scale, the father-daughter duo can calculate each animal's feed to gain ratio, which is the amount of weight gain an animal gets from the amount of feed it consumes. Bob and Katie are selecting for a lower feed intake ratio. “The lower, the better”, says Bob. So, the pair use technology on their farm to improve efficiency, which benefits both their bottom line and the environment.

Bob has his sights set on the next piece of technology to add to Gilbrea Farm: an automated device. This tool automates medication delivery, ensuring accurate weight-based dosing for each animal. The system also automatically records treatment details for each animal linking back to their RFID tag, which is vital for traceability.

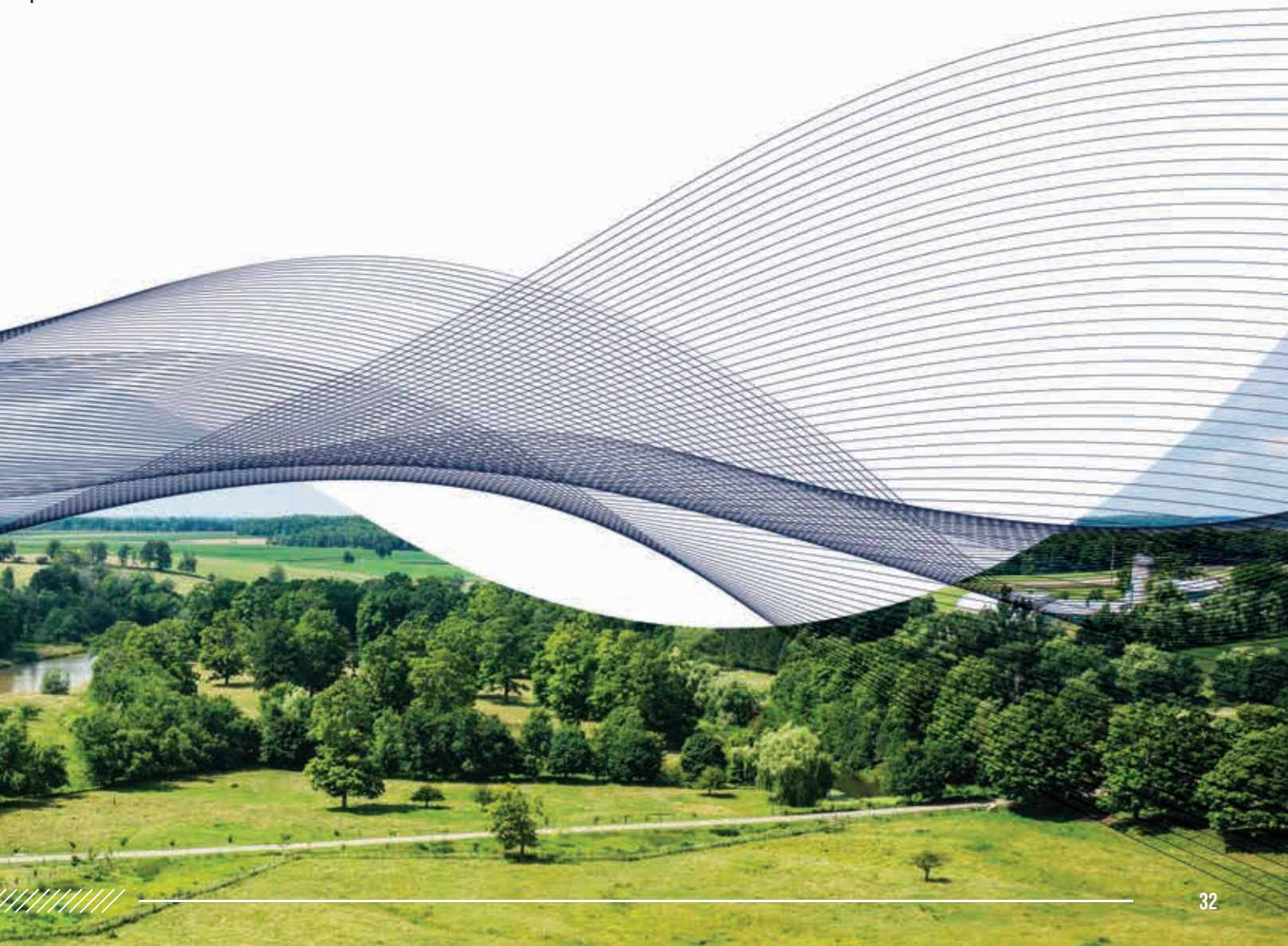


# SERVICE PROVIDERS IN WELLINGTON COUNTY

Now, where do you go to get started? Navigating new technology can be difficult, but several businesses and groups can help you determine what is possible and what would be best for your internet needs.



**Did you know** apps are available that can help you identify the Internet Service Providers associated with the towers in your area? The Canadian Cellular Towers Map website [www.ertyu.org/steven\\_nikkel/cancellsites.html](http://www.ertyu.org/steven_nikkel/cancellsites.html) provides a map of cell towers in Canada, including Bell, Rogers, Telus, and others. You can also download their app on the App Store or Google Play store.



## INTERNET SERVICE PROVIDERS

You will need to contact an Internet Service Provider (ISP) to get connected to the Internet. Finding out who can help you is easier than you may think. The federal government offers an online map of many ISPs. You can find the map at:

**[www.ic.gc.ca/app/sitt/bbmap/hm.html?lang=eng](http://www.ic.gc.ca/app/sitt/bbmap/hm.html?lang=eng)**

Of course, if you don't have internet at home, you may need to rely on a friend or on your local library to access this map. On this website, you can enter your address to see a list of active ISPs in your area and what types of internet services they offer. Please note this resource is not always fully up to date, so you will want to confirm your options by calling your desired ISPs.

Wellington County also maintains a directory of ISPs serving the County. Often, ISP websites also allow you to enter your address to see what services they offer in your area.

You can stay up to date on the County's internet projects and find a recent list of ISP providers by visiting their Internet Service and Resources page\*. You can also report un-serviced or underserved areas to the Smart Cities office. You can find the Internet Service and Resources page at: **[www.wellington.ca/internet](http://www.wellington.ca/internet)**

\*Please note, the County is continuously updating this list, and some providers may not be included.

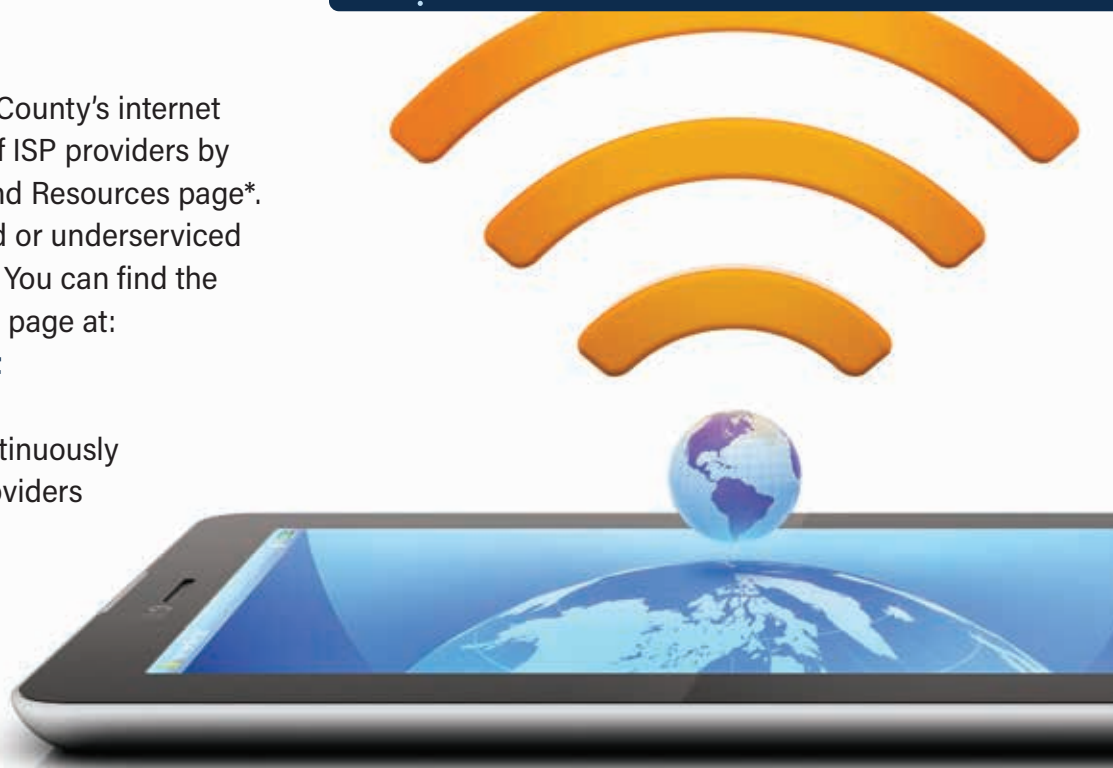


### LIBRARY HOTSPOTS AND MORE

If you only need Internet access for a short time, you may find Wellington County's **Library Hotspot Programme** helpful. You can borrow a hotspot for up to 7 days and it can provide unlimited Internet access for up to 15 devices, with no data cap.

The library also has iPads and Chromebooks available to borrow. You can use these devices to access online content through one of the library hotspots or their public Wi-Fi. All you need is a valid library card.

Your library is also the place to start if you have questions about using the Internet. Many branches offer digital literacy programmes.



## OTHER SERVICES

If you run into trouble, or if you need advice on how to get internet service, you may already know people who can help you. The following section outlines supports available to help.

## THE COUNTY OF WELLINGTON

Staff at the County of Wellington can provide more information on what internet services or resources are available. These staff are happy to help you find further support; please get in touch.

	NAME	ROLE	CONTACT INFORMATION
	<b>Crystal Ellis</b>	Director of Economic Development	E <a href="mailto:crystale@wellington.ca">crystale@wellington.ca</a> T 519.837.2600 x 2525
<hr/>			
	<b>Justine Dainard</b>	Smart Cities Project Manager	E <a href="mailto:justined@wellington.ca">justined@wellington.ca</a> T 519.837.2600 x 2540

The County of Wellington also has library professionals who can help you access the Internet as well as understand how to use it. You can find your local branch and learn more about the digital literacy services provided by your local library:  
**[www.wellington.ca/library](http://www.wellington.ca/library)**

The County is improving connectivity capabilities across Wellington County with their membership in the SWIFT programme which funds ISP expansion, and by encouraging and supporting local ISPs when they pursue funding. The County also gathers data to help “map the gaps” in services. County staff request that rural residents:

- Record your speed to ‘map the gaps’ by taking in the **CIRA test** from one of your devices.
- Report un-serviced or underserviced areas to the Smart Cities office using the online form at **[www.wellington.ca/internet](http://www.wellington.ca/internet)** or by telephone at 519.837.2600 x 2540.





## SWIFT

Wellington County is a partner in the Southwest Integrated Fibre Technology (SWIFT) project. This programme pools money from counties across Southwestern Ontario to improve internet access in the region's rural areas. Through SWIFT's first round of funding, the County benefitted from over \$12.1 million dollars of expanded internet connectivity in several areas. The next phase, SWIFT 2.0, will further expand projects and connectivity in the area.

SWIFT is surveying residents on the value of internet connectivity. The results assist in advocating for more financial support from funding agencies. You can help by completing the **SWIFT Rural Broadband Survey**.

## REFERENCES

Southwestern Integrated Fibre Technology Inc. (2020). Approved projects. SWIFT.  
[www.swiftruralbroadband.ca/projects/approved-projects](http://www.swiftruralbroadband.ca/projects/approved-projects)

Southwestern Integrated Fibre Technology Inc. Rural Broadband Survey. Retrieved from  
[www.swiftruralbroadband.ca/resources/r2b2-survey](http://www.swiftruralbroadband.ca/resources/r2b2-survey)

## WHO TO CALL

Internet Service Provider: If you have a service account but are having issues with speed or bandwidth, your ISP will have a support line that you may call. Not sure if it is your ISP that's the problem? Try this troubleshooting:

- Connect your device directly into your modem using a network cable. If the slow-down persists, it's likely your ISP. You can do a CIRA speed test, as outlined above, to measure your connection.
- If your ISP signal is good, connect your device directly to your router. If that connection causes a slow-down, the problem is likely with your router.

- If the router signal is good, the wireless portion of your connection is likely the problem. Use another device to see if the outgoing Wi-Fi signal is faulty, or if your first device was not handling the incoming signal properly.

Remember that some electrical machinery such as microwaves or air conditioners can interfere with your wireless connections.

Agronomists, who are experts in the science of soil management and crop production, may also be a useful resource. Your local agronomist can be a great support to help you better understand what technologies, platforms, and software might work best for you and your farm operation. To find an agronomist or other specialist near you, try the online **Ontario Institute of Agriologists Member Search Tool**.



## AGVISORPRO

AGvisorPRO is an app that connects growers with a network of agricultural experts remotely and quickly. Users can download the app to connect with a Canada-wide and international network of experts and schedule appointments. Visit the **AGvisorPRO website** to learn more.

## TECHNICAL SERVICES COMMUNICATION COMPANY:

Some communications companies will help you choose and install equipment, hang or trench cable, and even discuss what is needed for a co-op or a spur line from existing fibre. For a list of companies, see the **Wellington County Business Directory**.

## BUILDING THE FUTURE

Rural broadband options have been slow to arrive, but expansion of services is now happening faster than ever, bringing new opportunities and new challenges.

The County of Wellington prepared this guidebook as the first step in helping everyone find ways to access the support they need. We will continue to learn along with you, sharing what we know and helping where we can. We invite you to visit our **[www.wellington.ca/internet](http://www.wellington.ca/internet)** webpage for continued updates and information.





**Application**, or **app** : A software programme that runs on your device to complete a specific task. E.g. a spreadsheet tool, a videoconference programme.

**Bandwidth** : The maximum data transfer rate of a network or internet connection.

**Bookmark** : A shortcut that takes you directly to a favourite or frequently used website.

**Cloud technology** : Software/applications that store data on the Internet, rather than the user's local computer.

**Download** : how you receive information from the Internet. This information includes webpages that you want to access or videos you want to watch online.

**E-Commerce** : Business over the Internet. This can be Business to Consumer, or Business to Business.

**Edge Computing** : The practice of capturing, storing, processing and analyzing data near the client, where the data is generated, instead of in a centralized data-processing warehouse. Hence, the data is stored at intermediate points at the 'edge' of the network, rather than always at the central server or data center (via Enterpriser project).

**Ethernet** : A wired connection from a device to the internet network.

**Hardware** : The physical pieces of technology, like your keyboard, mouse, screen, or tablet.

**Hotspot** : Small devices send signals to cellphone towers to enable your computer and other devices connect to the Internet.

**Internet of Things (IoT)** : A network of data-sharing devices (sensors, equipment, etc.) which can be connected to the Internet and are intended to enable automation.

**Internet Service Provider (ISP)** : A company that provides you with access to internet services.



**Kilobit** and **Kilobyte** : Units of digital information used to communicate file size. See page 15 for a full description.

**Latency** : The delay your internet connection has in doing the things you want it to do.

**Long Range Wi-Fi Antennae** : Antenna that can carry a Wi-Fi signal up to a few kilometres.

**Megabit** and **Megabyte** : Units of digital information used to communicate file size. See page 15 for a full description.

**Modem** : A device that connects your home to the Internet at a single point.

**Precision Agriculture** : Farm management concept based on observing, measuring, and responding to crop or livestock data. Also known as Digital Agriculture.

**Router** : Device that directs internet traffic within your home among your personal devices to make sure information goes where it should. Commonly integrated with the modem.

**RTK (real-time kinematic) positioning** : Uses satellite and cellular-based positioning equipment (GPS) to guide agricultural vehicles. Commonly, these systems are used in autosteer technologies.

**Software** : Programs and applications that you use on your computer, tablet, or phone.

**Upload** : Sending information, such as reports, from your computer to another system.

**URL (Uniform Resource Locator)** : The full address of a website.

**Wi-Fi** : Wireless connection from your device (e.g., laptop, phone) to the Internet.

**Wi-Fi Booster/Range Extender** : A device that sits near the edge of your router's range and picks up the signal to send it further.

## BUSINESS DIRECTORY

### BUSINESS MANAGEMENT SOFTWARE

#### Farm Credit Canada AgExpert

Address: 100-120 Research Lane  
Guelph ON N1G 0B5

Phone: 1.800.667.7893

Email: [support@fccagexpert.ca](mailto:support@fccagexpert.ca)

Website: [www.agexpert.ca/en/products/accounting.html](http://www.agexpert.ca/en/products/accounting.html)

Services: Accounting and farm record-keeping software

#### QuickBooks-Intuit Canada

Phone: 1.888.829.8589

Support: [help.quickbooks.intuit.com/en\\_ca/contact](http://help.quickbooks.intuit.com/en_ca/contact)

Website: [www.quickbooks.intuit.com/ca](http://www.quickbooks.intuit.com/ca)

Service: Accounting software

#### Sage

Phone: 1.866.850.0687

Website: [www.sage.com/en-ca](http://www.sage.com/en-ca)

Service: Accounting software

#### Local Line

Address: 5 Michael Street  
Kitchener ON N2G 1L7

Phone: 226.646.7301

Email: [info@localline.ca](mailto:info@localline.ca)

Website: [site.localline.ca](http://site.localline.ca)

Service: E-commerce platform for farms and farmers markets

#### Shopify

Support: [help.shopify.com/en/questions?shpxid=023fef2e-02AF-4C7E-2D8E-BE2E0915B7CD#/login](https://help.shopify.com/en/questions?shpxid=023fef2e-02AF-4C7E-2D8E-BE2E0915B7CD#/login)

Website: [www.shopify.ca](http://www.shopify.ca)

Service: E-commerce platform

### MAPPING SOFTWARE FOR AGRICULTURE

#### Rise UAV Services

Email: [riseuav@gmail.com](mailto:riseuav@gmail.com)

Phone: 705.718.0741

Website: [www.riseuavservices.com/contact](http://www.riseuavservices.com/contact)

Service: UAV Services

#### Aireborne Recon Canada

Address: 7 Selway Court  
Hamilton ON L8K 6L9

Phone: 905.517.8572

Email: [info@airbornerecon.ca](mailto:info@airbornerecon.ca)

Website: [www.airbornerecon.ca](http://www.airbornerecon.ca)

Service: UAV/RPAS drone precision agriculture photography

#### Drone Services Canada

Address: 2-588 Upper Gage Avenue  
Hamilton ON L8V 4J6

Phone: 905.481.0112

Email: [info@droneservicescanadainc.com](mailto:info@droneservicescanadainc.com)

Website: [www.droneservicescanadainc.com](http://www.droneservicescanadainc.com)

Service: UAV services

### **Deveron UAS**

Support: [www.deveronuas.com/contact-us](http://www.deveronuas.com/contact-us)  
Website: [www.deveronuas.com](http://www.deveronuas.com)  
Service: UAV services

### **Ag Business & Crop Inc.**

Address: 1-131 Frank Lambier Court  
Palmerston ON N0G 2P0  
Phone: 519.343.5454  
Email: [sales@agbusiness.ca](mailto:sales@agbusiness.ca)  
Website: [www.agbusiness.ca](http://www.agbusiness.ca)  
Services: UAV services and data analytics

## **DATA AGGREGATION SERVICES**

### **Telus Agriculture**

Support: [www.telus.com/en/bc/agriculture/contact?INTCMP=tcom\\_agriculture\\_agri-business\\_to\\_contact\\_request-callback](http://www.telus.com/en/bc/agriculture/contact?INTCMP=tcom_agriculture_agri-business_to_contact_request-callback)  
Website: [www.telus.com/en/bc/agriculture/agri-business?INTCMP=tcom\\_agriculture\\_agriculture\\_to\\_agri-business\\_bridging-info-block](http://www.telus.com/en/bc/agriculture/agri-business?INTCMP=tcom_agriculture_agriculture_to_agri-business_bridging-info-block)  
Services: Offers a range of farm management software, including: Agrian, Farm at Hand, Decisive Farming, Feedlot Health Management Services, etc.

### **Farmers Business Network**

Phone: 844.200.FARM (3276)  
Email: [info@farmersbusinessnetwork.com](mailto:info@farmersbusinessnetwork.com)  
Website: [www.fbn.com/en-ca/about](http://www.fbn.com/en-ca/about)  
Services: Seed and agronomic analytics; farm and team operations record-keeping

### **Climate FieldView**

Phone: 1.888.924.7475  
Email: [support@climate.com](mailto:support@climate.com)  
Website: [www.climatefieldview.ca](http://www.climatefieldview.ca)  
Service: Farm management software

### **Granular**

Phone: 888.435.4726  
Website: [ca.granular.ag](http://ca.granular.ag)  
Service: Farm management software

## **INTERNET SERVICE PROVIDERS**

### **Bell Canada (National)**

Phone: 1.877.292.0877  
Websites: [www.bell.ca/bell\\_internet](http://www.bell.ca/bell_internet)  
[www.bell.ca/mobility/mobile-internet-devices-listing](http://www.bell.ca/mobility/mobile-internet-devices-listing)  
Service: Internet service provider

### **Bell Canada (Fergus)**

Address: 890 Tower Street South  
Fergus ON N1M 3N7  
Phone: 519.843.2700  
Service: Internet service provider



## BUSINESS DIRECTORY

### INTERNET SERVICE PROVIDERS

#### Cogeco

Address: 475 St. Patrick Street West  
Fergus ON N1M 1M2  
Phone: 1.866.261.4447  
Website: [www.cogeco.ca/en](http://www.cogeco.ca/en)  
Service: Internet service provider

#### Eh!Tel

Address: 392058 Grey County Road 109  
Holstein ON N0G 2A0  
Phone: 519.594.0946  
Email: [info@ehtel.ca](mailto:info@ehtel.ca)  
Website: [www.ehtel.ca](http://www.ehtel.ca)  
Service: Internet service provider

#### Netflash

Address: 1232 Victoria Street North  
Kitchener ON N2B 3C9  
Phone: 877.638.3527  
Website: [www.netflash.net](http://www.netflash.net)  
Service: Internet service provider

#### North Frontenac Telephone Company

Address: 1019 Windwood Drive  
Sharbot Lake ON K0H 2P0  
Phone: 888.638.3575  
Email: [info@nftctelecom.com](mailto:info@nftctelecom.com)  
Website: [www.nftctelecom.com/home-nftec](http://www.nftctelecom.com/home-nftec)  
Service: Internet service provider

#### Mornington Communications Co-Operative Ltd.

Phone: 1.866.263.8692  
Email: [support@mornington.ca](mailto:support@mornington.ca)  
Website: [www.mornington.ca/shop/internet](http://www.mornington.ca/shop/internet)  
Service: Internet service provider

#### Rogers (National)

Phone: 1.855.877.3824  
Support: [www.rogers.com/consumer/support/contactus](http://www.rogers.com/consumer/support/contactus)  
Websites: [www.rogers.com/web/consumer/internet](http://www.rogers.com/web/consumer/internet)  
[www.rogers.com/mobility/mobile-internet](http://www.rogers.com/mobility/mobile-internet)  
Service: Internet service provider

#### Rogers (Fergus)

Address: 794 Tower Street South  
Fergus ON N1M 2R3  
Phone: 289.349.1900  
Service: Internet service provider

#### Standard Broadband

Address: 24 Commerce Crescent  
Acton ON L7J 2X3  
Phone: 866.569.4147  
Website: [www.standardbroadband.ca/residential-services/rural-high-speed-internet](http://www.standardbroadband.ca/residential-services/rural-high-speed-internet)  
Service: Internet service provider

**Starlink**

Website: [www.starlink.com](http://www.starlink.com)  
Service: Internet service provider

**Waterloo Wireless**

Address: 235 Ardelt Avenue, Unit 2B  
Kitchener ON N2C 2M3  
Support: 1.888.405.8946  
Website: [www.waterloowireless.com/our-areas](http://www.waterloowireless.com/our-areas)  
Service: Internet Service Provider

**Wightman (Head Office)**

Support: [www.wightman.ca/contact](http://www.wightman.ca/contact)  
Website: [www.wightman.ca/residential/  
internet](http://www.wightman.ca/residential/internet)  
Service: Internet service provider

**Wightman (Arthur)**

Address: 148 George Street, Suite 2  
Arthur ON N0G 1A0  
Phone: 1.877.477.2177  
Email: [ressales@wightman.ca](mailto:ressales@wightman.ca)  
Service: Internet service provider

**Wightman (Clifford)**

Address: 100 Elora Street North  
Clifford ON N0G 1M0  
Phone: 1.877.477.2177  
Email: [ressales@wightman.ca](mailto:ressales@wightman.ca)  
Service: Internet service provider

**Wightman (Fergus)**

Address: 490 St. Andrew Street West  
Fergus ON N1M 1P3  
Phone: 1.877.863.4273  
Email: [ftthenquiry@wightman.ca](mailto:ftthenquiry@wightman.ca)  
Service: Internet service provider

**Xplornet**

Phone: 877.959.5717  
Support: [www.xplornet.com/contact-us/sales](http://www.xplornet.com/contact-us/sales)  
Website: [www.xplornet.com](http://www.xplornet.com)  
Service: Internet service provider

## LIST OF HYPERLINKS

Note: These URLs are listed in the order of appearance in the report.

### **Wellington County Taste Real**

[www.tastereal.ca](http://www.tastereal.ca)

### **Circle R Lamb Website**

[www.circlerlamb.ca](http://www.circlerlamb.ca)

### **Revolution Wool Company**

[www.revolutionwoolco.com](http://www.revolutionwoolco.com)

### **Gilbrea Farm**

[www.gilbreafarm.com](http://www.gilbreafarm.com)

### **Salad Days**

[www.saladdaysfarm.ca](http://www.saladdaysfarm.ca)

### **Elora Research Station**

[www.uoguelph.ca/alliance/research-facilities/research-stations/ontario-crops-research-centre-sites/ontario-crops-research](http://www.uoguelph.ca/alliance/research-facilities/research-stations/ontario-crops-research-centre-sites/ontario-crops-research)

### **County of Wellington Internet Speed Test**

[performance.cira.ca/wellingtoncounty](http://performance.cira.ca/wellingtoncounty)

### **E-commerce for Ag Business: Advantages and Challenges (Penn State Extension)**

[www.extension.psu.edu/e-commerce-for-ag-business-advantages-and-challenges](http://www.extension.psu.edu/e-commerce-for-ag-business-advantages-and-challenges)

### **A Guide to Direct Sales to Consumers During COVID (Ontario Federation of Agriculture)**

[www.ofa.on.ca/wp-content/uploads/2020/03/OFA-Direct-to-Consumer-Sales-Guide\\_March-2020.pdf](http://www.ofa.on.ca/wp-content/uploads/2020/03/OFA-Direct-to-Consumer-Sales-Guide_March-2020.pdf)

### **Direct Farm Marketing Business Resources (OMAFRA)**

[www.omafra.gov.on.ca/english/busdev/directfarmmkt/directfarmmarketing2016.pdf](http://www.omafra.gov.on.ca/english/busdev/directfarmmkt/directfarmmarketing2016.pdf)

### **E-commerce basics: 3 keys to online sales success (Business Development Canada)**

[www.bdc.ca/en/articles-tools/marketing-sales-export/sales/3-keys-online-sales-success](http://www.bdc.ca/en/articles-tools/marketing-sales-export/sales/3-keys-online-sales-success)

### **Online Marketing and the Basics of Direct-to-Consumer Sales (Northern Ontario Farm Innovation Alliance)**

[www.nofia-agri.com/post/online-marketing-and-the-basics-of-direct-to-consumer-sales](http://www.nofia-agri.com/post/online-marketing-and-the-basics-of-direct-to-consumer-sales)

### **Setting up a Business Website, Business News Daily**

[www.businessnewsdaily.com/4661-starting-a-business-website.html](http://www.businessnewsdaily.com/4661-starting-a-business-website.html)

### **Create Your Website (BDC)**

[www.bdc.ca/en/articles-tools/technology/create-website#cat-3](http://www.bdc.ca/en/articles-tools/technology/create-website#cat-3)



**Newsletters (Wellington County)**

[www.wellington.ca/en/business/ed-newsletters.aspx](http://www.wellington.ca/en/business/ed-newsletters.aspx)

**Rise UAV**

[www.riseuavservices.com](http://www.riseuavservices.com)

**Airborne Recon Canada**

[www.airbornerecon.ca](http://www.airbornerecon.ca)

**Drone Services Canada**

[www.droneservicescanadainc.com](http://www.droneservicescanadainc.com)

**Deveron UAS**

[www.deveronuas.com](http://www.deveronuas.com)

**Ag Business & Crop Inc.**

[www.agbusiness.ca](http://www.agbusiness.ca)

**Canadian Cellular Towers Map**

[www.ertyu.org/steven\\_nikkel/cancellsites.html](http://www.ertyu.org/steven_nikkel/cancellsites.html)

**Federal Government ISP Map**

[www.ic.gc.ca/app/sitt/bbmap/hm.html?lang=eng](http://www.ic.gc.ca/app/sitt/bbmap/hm.html?lang=eng)

**County of Wellington ISP Providers and Projects**

[www.wellington.ca/en/business/ed-internet.aspx](http://www.wellington.ca/en/business/ed-internet.aspx)

**Wellington County Library Hotspot Program**

[www.wellington.ca/en/discover/hotspots.aspx](http://www.wellington.ca/en/discover/hotspots.aspx)

**Find your Local Library Branch**

[www.wellington.ca/en/discover/serviceslibrary.aspx](http://www.wellington.ca/en/discover/serviceslibrary.aspx)

**CIRA Test**

[performance.cira.ca](http://performance.cira.ca)

**Smart Cities Online Form**

[www.wellington.ca/Modules/email/emailattachment.aspx?CV2=NXmJjdsgPNpoUeu8OUmGggeQuAleQuAl&ref=https://www.wellington.ca/en/business/ed-our-food-future.aspx&lang=en](http://www.wellington.ca/Modules/email/emailattachment.aspx?CV2=NXmJjdsgPNpoUeu8OUmGggeQuAleQuAl&ref=https://www.wellington.ca/en/business/ed-our-food-future.aspx&lang=en)

**Ontario Institute of Agrologists Member Search**

[www.oia.on.ca/search](http://www.oia.on.ca/search)

**Wellington County Business Directory**

[directory.wellington.ca](http://directory.wellington.ca)

**AGvisor PRO**

[www.agvisorpro.com](http://www.agvisorpro.com)





**WELLINGTON  
COUNTY**

<sup>OM</sup>Official Mark of The Corporation of the County of Wellington

