élections Québec

Guide for information technology personnel in educational institutions

Room layout: general considerations

The solution advocated for voting in educational institutions requires the use of a Netgear modem to supply Internet service to laptops equipped with a wireless card. This solution requires Internet connectivity:

- by means of a wired link provided by the educational institution, and/or
- by means of a cellular link (3G or LTE technology).

The following diagram outlines this solution:
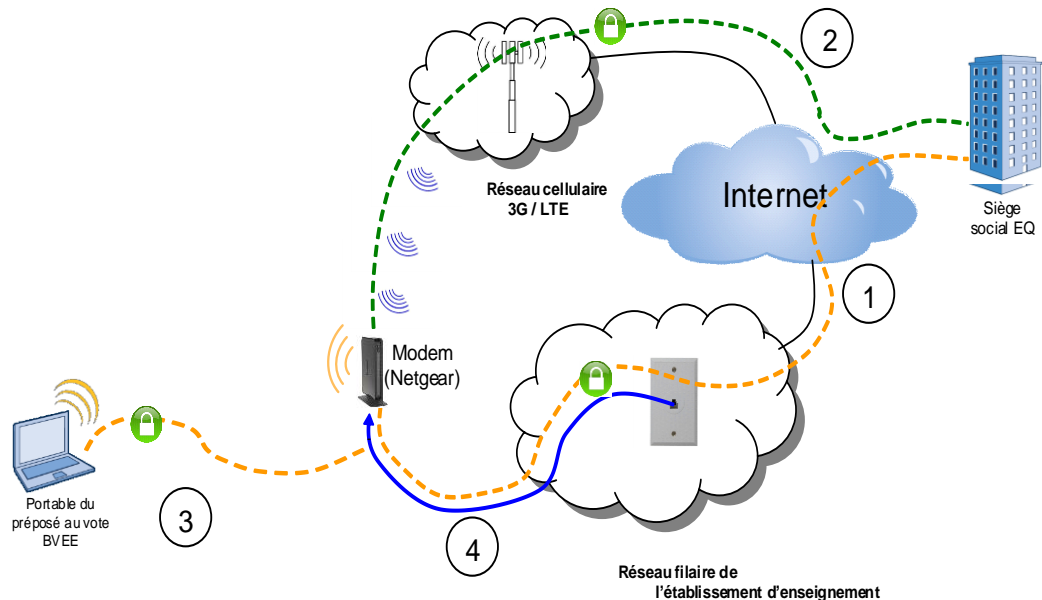
Translation of used terms

Portable du préposé au vote BVEE: Élections Québec polling attendant's laptop
Modem (Netgear): Netgear modem
Réseau cellulaire 3G/LTE: 3G/LTE cellular network
Siège social EQ: Élections Québec head office
Réseau filaire de l'établissement scolaire: Educational institution's wired network

The Netgear modem establishes a link with the Internet (via its WAN [Rj45] port) usingthe institution's wired network (link 1 in the diagram) by default, because it has a greater capacity. All educational institutions have this type of wired network. The cellular Internet connection (link 2 in the diagram) will be used as a back-up measure in the event that the wired network fails or no such network can be supplied by the educational institution.

If the wired connection is interrupted, the modem will detect the outage and automatically switch to the cellular Internet connection. As soon as the wired connection is restored, the wireless router will automatically reactivate the wired connection.

Laptops are connected to the wireless modem (NET) by means of a secure wireless network (link 3 in the diagram) and access Élections Québec's head office by using a virtual private network (VPN) through the Internet connection provided by link 1 or 2.

The secure wireless network (link 3) will have its own dedicated SSID (an abbreviation for the name of the wireless network), **DGEQ-DSB**, and should in no way impede the operations of the educational institution's other wireless networks. The equipment installed will adapt to the existing networks and automatically use a 2.4-Ghz or 5-Ghz frequency range. Since only devices authorized by Élections Québec will be able to connect to this network, it will be impossible for other devices (e.g., those of students or institution staff) to connect to it. WPA2 PSK authentication is used.

The laptops used by polling station personnel and the special board of revisors must be located within 70 feet of the modem (NET) installed as part of Élections Québec's infrastructure.

In addition, to optimize signal reception, there must be as few obstacles as possible between the modem (NET) and the laptops. Gypsum and wood partitions between the computers and wireless modem (NET) are acceptable, but there must not be any concrete or metal walls. In addition, basement rooms should not be used.

Every wireless modem (NET) can be used with a maximum of 10 laptops.

If the premises are too small to accommodate all the computers, adjacent premises can be used provided that the 50-foot maximum distance is respected and that obstacles are limited in number. Otherwise, wired and cellular access points must be available in every room.
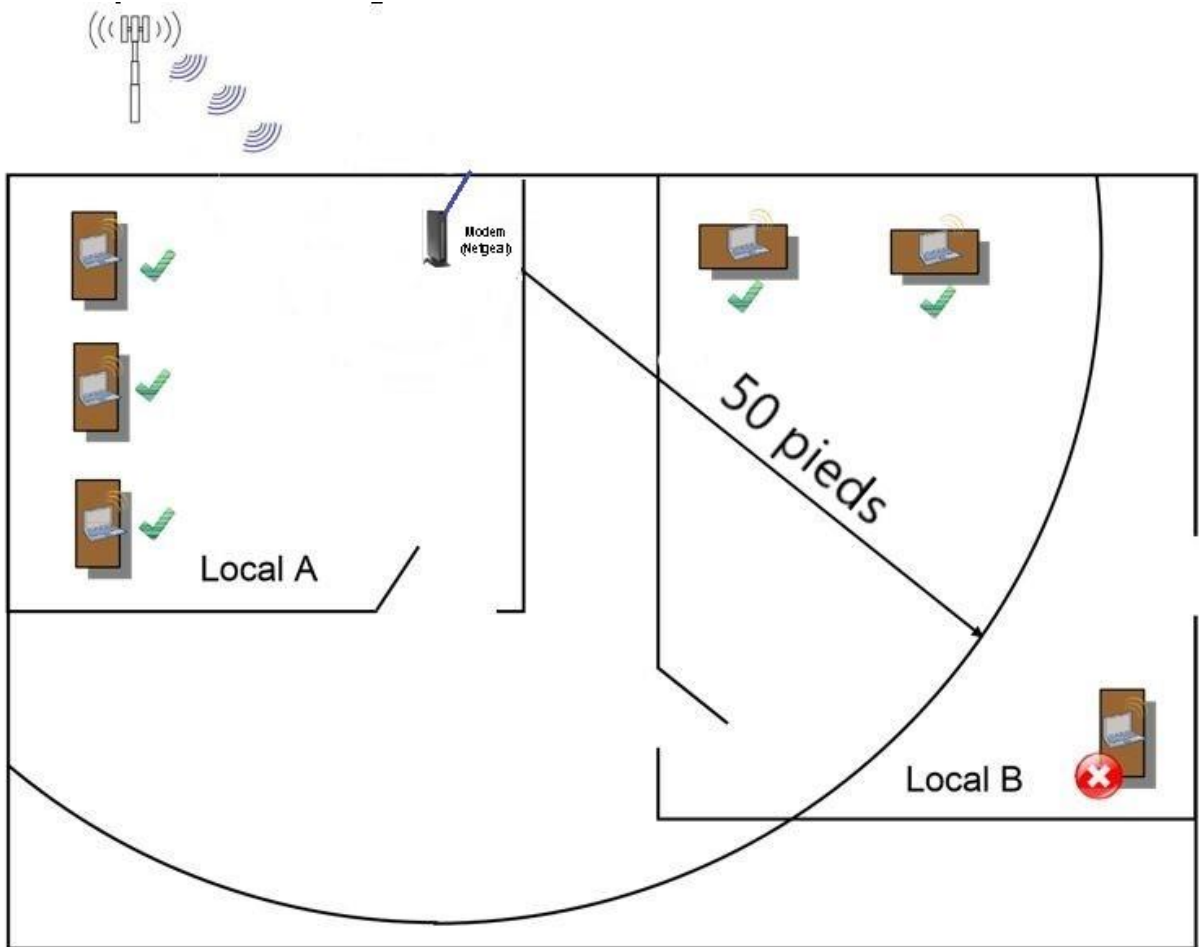
Sample configurations

Figure A

In Figure A, the modem is connected to the institution's wired network and is located in a room with good cellular coverage. Most of the computers in Room B (which could be in an open-concept mezzanine on the second floor) are covered by the secure wireless network. One of the computers is poorly positioned because it is over 50 feet from the wireless modem.
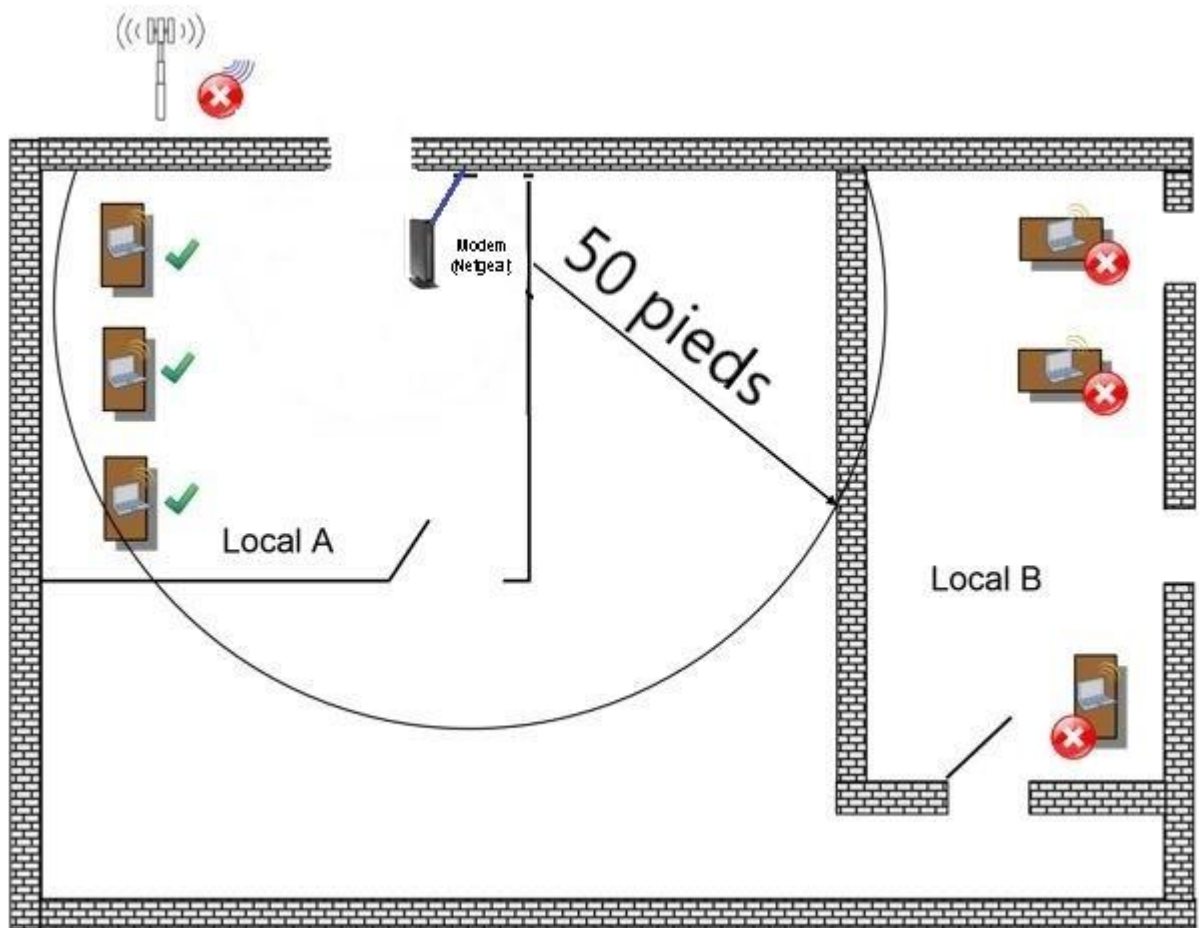
Figure B

In Figure B, two problems are apparent. The wireless modem in Room A does not receive an adequate cellular signal. In the event the institution's wired network fails, the computers in Room A will no longer be able to communicate with Élections Québec. In addition, the computers in Room B are over 50 feet from the wireless modem… not to mention the concrete wall separating the two rooms.
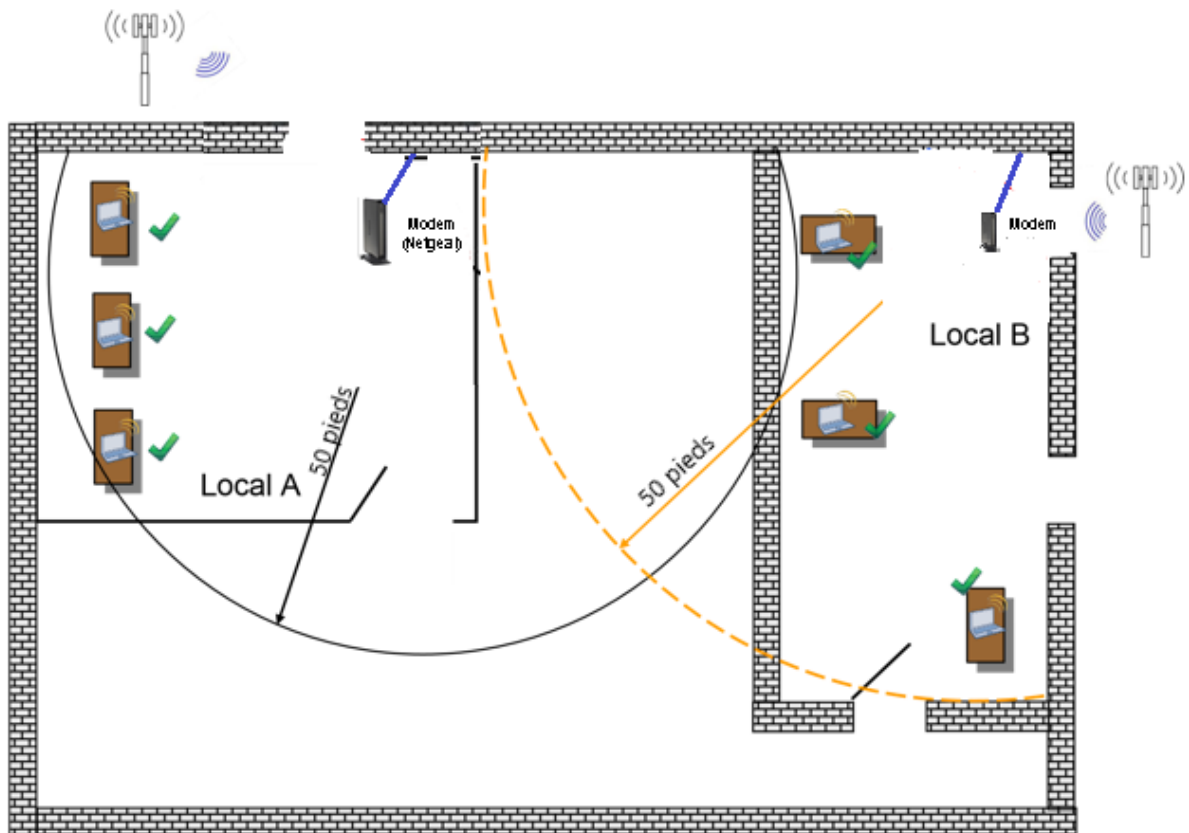
Figure C

Figure C resolves the problems seen in Figure B. In light of the distance exceeding 50 feet between the two rooms, a second wired Internet access point is provided by the institution so that Élections Québec can install another modem (NET) and thereby cover the needs of Room B. The modems have also been positioned so as to receive an adequate cellular signal in both rooms.

Of course, it is easier and more economical to try to install as many devices and people as possible in the same space.

Availability of a wired Internet access point

In every room where the modem (NET) is installed, it is important to have an Ethernet (RJ-45) wall jack or an Ethernet cable allowing for Internet speeds of at least 10 Mbits/s. If an Ethernet cable is provided, it must be long enough for the modem to be positioned correctly.

Availability of 3G or LTE cellular coverage

In every room where a modem is installed, it is important to have 3G or LTE cellular coverage provided by a major supplier (e.g., Telus, Bell or Rogers) with sufficient signal strength for at least 2 Mbits/s where the modem is located.

Measuring the strength of the cellular link

It may be useful to measure the power and quality of the cellular signal in the rooms in question. OOKLA's free app "Speedtest" (available from the App Store or Play Store) is easy to use and available for iPhone and Android devices.

To measure the speed of the cellular link, turn off the Wi-Fi on the telephone used to take the measurement. You may want to measure the speed at different spots in the room to determine the best location for Élections Québec's modem. Measuring the speed uses a few megabytes of cellular data, so you may wish to proceed cautiously.

Availability of a power supply

A power supply must be continuously available to power each modem (NET) and the laptops. A wall jack must be located nearby.

Network security

Network security is an important consideration for Élections Québec, just as it is for educational institutions. Élections Québec's technical staff will be available to discuss the steps that can be taken to ensure its installation is as unobtrusive as possible in relation to the institution's wired and wireless networks. Once the necessary data has been collected in the preparation stage, we will be able to set specific technical requirements and inform the institution's technical staff with a view to reaching an agreement. For instance, we will be able to identify the Internet addresses and communications ports that we will use on the wired network so that the institution's IT personnel can, if desired, restrict access to its infrastructure.

Technical requirements

We suggest that you read the document "Élections Québec technical requirements regarding Internet connections for educational institution polling station kits."