# Smart Devices & Services Supporting Independent & Assisted Living Facilities

# Administrator's & Engineer's Guide




**Seniors Independent Living Collaborative**

**2021**

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# Contents

# Introduction

This guide is intended to inform administrators and facility engineers about the benefits of smart devices and services and to provide applications and planning guidance that can enhance independent and assisted living operations and resident care.

As more than 75 million baby boomers move into their retirement years, an average of 10,000 Americans turn 65 each day - making seniors the fastest growing segment of the US population. This rapid increase in their numbers is driving a growing nationwide demand for resources and solutions to better support older adult residents and better equip independent and assisted living professionals to offer the highest quality in residential living environments. Fortunately, smart devices and smart utility pricing services can assist administrators and facility engineers in this pursuit, while enhancing resident safety, comfort, convenience and connection with their families, care providers and communities.

The guide is structured in four sections. The first section introduces smart devices and the hardware and software required for their operation. The section also provides pricing information and the available sources of financial support that may be able to assist facility residents in purchasing devices.

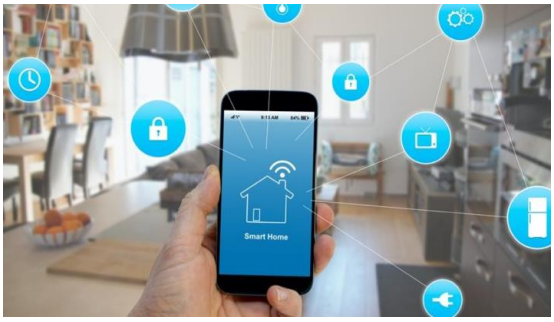
The second section describes smart device applications that can enhance independent and assisted living facility operations and resident care.

The third section describes the residential smart pricing services that are available through Ameren Illinois and ComEd because of their deployment of smart meter technology across the state. Enrollment in these services/programs can significantly increase energy efficiency and reduce utility costs for the facility and for residents.

The fourth section provides planning guidance and resources that facility administrators and engineers can use to explore, select, and purchase smart devices and to enroll in utility smart pricing services. This section includes a listing of popular smart devices for each of the applications described in the guide (including a description of their functions and pricing), a glossary of commonly used terms, answers to frequently asked questions, and a list of Illinois' Internet service providers.

The content of this guide is derived from research conducted by the Seniors Independent Living Collaborative (SILC) and the University of Illinois at Chicago's (UIC) Department of Electrical & Computer Engineering, the Institute of Health Research & Policy, and the School of Public Health Policy & Administration. The research entailed a review of subject literature, survey research and interviews with administrators, engineers, and care providers at nine independent and assisted living facilities of various sizes and service levels in Chicago and in downstate Illinois communities.

# Smart Devices & Services




Smart devices utilize the Internet and wireless communication technology to remotely control and automate the operation of electronic and electro-mechanical equipment and systems from practically any location through use of a mobile device or voice-activated digital assistant. This includes the control and automation of heating, ventilation, and air-conditioning systems and the operation of lighting, windows, doors, shades, appliances, security, and entertainment systems and much more. The pairing of these smart devices with available adaptive/assistive technologies ensures that a wide range of people with disabilities can take advantage of the independent living benefits they provide.

Smart services are those utilizing the same Internet and wireless communication technology to deliver a host of consumer services quickly, efficiently, and often at less expense. Examples of smart services include the various voice-activated digital assistance services, online grocery and consumer product shopping services, and cost-saving utility programs and services now offered by Illinois' largest utilities. The smart digital assistant and shopping services are discussed in the context of their companion devices described below. The smart cost-saving utility programs and services are described in a standalone section below given the significant contribution they make to increasing housing affordability and cost-efficient facility operations.

## Resident, Care Staff & Management Benefits

The use of smart devices has the potential to significantly improve the safety, security, comfort and convenience of residents in independent and assisted living facilities, and the efficiency and effectiveness of resident care and facility operations. These benefits include the following.

**Resident Benefits**

- Enhances the safe and convenient operation of residential unit lighting, space conditioning, entertainment and hazard detection equipment and appliances.
- Extends independence by providing immediate digital access to news, weather, information, entertainment, and internal and external care providers.
- Enhances the personal safety and security of residents in remote housing units with their own entryways.
- Decreases social isolation by increasing communication with family members, friends, outside care providers, social networks, and their communities.

**Care Staff Benefits**

- Improves resident healthcare monitoring and staff emergency response capabilities.
- Enables outside healthcare providers to remotely diagnose and deliver medical direction to care staff.

**Management Benefit**

- Enhances monitoring capability of facility interior and exterior space from any location.
- Enables the remote operation of facility lighting, heating-ventilation and air-conditioning, communication and hazard detection equipment and systems.
- Enables remote monitoring and control of residential and commercial appliances.
- Increases facility energy efficiency and reduces utility costs.

## Required Hardware & Software

Smart devices operate in response to digital signals they receive from a user sent through a command device over an Internet or a wireless Bluetooth connection. The key hardware and software components that make this possible include Internet service, a modem, a wireless router, a command device, and a wireless Bluetooth connection. Each of these components and their interactions are briefly described below.

**Internet Service**

Internet service provides a user access to email, news, online shopping, music, television programs and movies and much more and allows a user to set up a wireless home or area network to support the operation of smartphones, computers and smart devices.

A user subscribes to this service through an Internet Service Provider (ISP). Most telephone or cable television companies now serve as ISPs in addition to independent providers such as Comcast, AT&T, Earthlink, ViaSat, Atlantic and many others. There are 5 different types of internet connection that can be established. These are Dial-up, DSL, Optical Fiber, Cable, and Cellular Networks.

- Dial-up connects to the Internet through a telephone line using a modem (a device that converts data to electrical signals) and is slower than the other connections described below but, in some areas, may be the only option available.

- Digital Subscriber Line (DSL) is a newer modem technology which allows data to move at higher speeds. As a result, DSL provides broadband Internet connection with the bandwidth necessary to accommodate the large data streams required to watch television programs and movies, to play games and to rapidly browse the Internet.

- Optical fiber provides broadband Internet connection using optical communication and is currently offering the fastest internet speeds.

- Cable connects to the Internet through your television cable and like DSL, is a broadband connection.

- Cellular networks are typically accessed through smartphones and provide broadband Internet connections, but they can also be used to establish a home Internet connection.

The type of Internet connections offered will vary by provider and each will offer alternative data service speeds with different price points. The faster the Internet connection, the more a user will pay per month. Once the Internet plan is purchased over the phone or on the Internet, the company will send out a technician to set up service and may include the installation of a modem and other equipment necessary to establish the Internet connection.

***Important Note:*** Users should be aware that a less costly Internet plan will provide slower speed that may impede the set-up and operation of a smart device, so it is recommended that the minimum required operating speed be confirmed before a device is purchased. On the other end of the speed spectrum, consumers should be aware that many smart devices will not work on ultra-high speed 5G broadband Internet service. Therefore, confirming the maximum operating speed of service is also advisable before purchase.

Internet Accessibility Discounts – Some ISPs provide discounted service to low-income users. Presently, one such program is AT&T's Internet Access Program that offers landline Internet service to users that participate in the Supplemental Nutrition Assistance Program (SNAP) for as little as $10 per-month. The program also provides free installation and in-home Wi-Fi with no annual contract or deposit. To learn more, visit: https://www.att.com/internet/access/

Additional low-cost plans under $50 per-month can be found on the Whistleout website at: https://www.whistleout.com/Internet/Guides/cheap-internet-plans

**Modem**

This device transmits digital information from a user's computer and other connected smart devices to the Internet Service Provider (ISP) and then to other locations and users connected to the Internet. Although a user typically rents a modem from the ISP, they may also be purchased from a retail store. Depending on the selected ISP, the modem is plugged into a telephone jack, an optical fiber or cable connection and then into a laptop or desktop computer where on-screen instructions are provided to set it up. Once installed, the wireless router can be plugged into the modem to broadcast the Internet signal throughout the residential unit or across common areas of an independent or assisted living facility. Some modems feature a built-in router, described below, so the rental or purchase of a separate device is not necessary.

**Wireless Router**

A wireless router is a device that broadcasts an Internet signal from a modem across a large area, creating what is known as a "Wireless Fidelity" or "Wi-Fi" network. This network connects devices located within the same area to each other through a wireless radio frequency and to the Internet through a modem. To set-up the wireless router a user plugs it into a computer and through a web-browser follows the on-screen instructions. During this process, the user will give the router a unique name or "Wireless SSID" and a password that will be used later to connect each smart device in the Wi-Fi network. Once that set-up is complete, the user disconnects the computer, and the Wi-Fi is ready for use.

For larger spaces, users may want to consider a range extender device or a mesh Wi-Fi system. This system has a base or main router that connects to the modem and additional satellite modules that are placed throughout the facility. This system eliminates dead spots where the Internet is not available. These systems consistently provide a steady, strong Internet signal inside the facility, no matter a user's location.

***Important Note*** – Many smart devices only operate on a 2.4 GHz Wi-Fi router. Therefore, make sure that any upgrade to a 5G Wi-Fi router, includes the option to accommodate devices operating at a 2.4 GHz bandwidth, as well.

**Command Device**

A command device can be a smartphone, tablet, laptop/desktop computer or voice-activated personal assistant with an established connection to a local Wi-Fi network. When a smart device is purchased, the user will use the command device to go online to the purchased device's website, download its application and follow the on-screen instructions to link the two devices. This will entail registering the purchased device with the home's local Wi-Fi network by entering its name and password. The user is then able to control the purchased device through the shared Wi-Fi connection. While most smart

devices operate through a Wi-Fi network connection or a dedicated Zigbee,Z-Wave or Thread protocol network, some operate through a wireless Bluetooth connection.

**Bluetooth Connection**

Bluetooth is a wireless technology standard that allows connected mobile devices to exchange data over short distances up to 30 feet. A Bluetooth connected device does not use the Internet to facilitate these exchanges but instead uses radio waves to pair the command device with the connected mobile or smart device.

## Cost & Financial Assistance

Smart devices range in cost from as little as $8 for a lightbulb or an outlet to $500 dollars for an advanced security or leak detection system. For users with disabilities requiring adaptive/assistive technology to operate a command device, there will be an additional cost ranging from as little as $16 for a touch switch to $16,000 for an advanced eye gaze system. Section four of the guide provides a list of some of the more popular smart devices currently on the market along with a description of their features and prices.

Smart services associated with some devices (such as grocery shopping) will also carry a service fee and/or require a monthly subscription. However, many services made possible by smart technologies save rather than cost users money, such as the cost-saving utility smart pricing programs described in this guide. In addition, many of the functions that smart devices and services provide reduce the need for and costs associated with personal assistants that would otherwise be necessary.

For residents of facilities that have control of their own residential spaces, financial assistance may be available to aid in the purchase of smart devices, and particularly when they entail modifications enabling a person with a disability to live more independently. These include automated climate controls, accessible computer equipment, remote controlled lighting and door openers, software tools, wearable medical alert devices and remote monitoring and security systems. Available financial assistance includes grants, loans, charitable services, and Medicare, Medicaid, VA, HUD and U.S. Department of Agriculture loan and grant programs. A brief description of each follows.

**Home Improvement Grants** – These are typically one-time grants made by independent foundations, corporate giving programs, nonprofit charitable organizations, and municipal entities through a variety of community service initiatives. Advocacy programs and Centers for Independent Living can provide guidance on researching available home improvement grant opportunities for people with disabilities in Illinois. Grants do not need to be repaid.

**Low-Interest Loans** – Some Illinois municipalities and governmental entities operate low-interest loan programs for home modifications or guarantee loans to encourage banks to be less restrictive in their lending requirements to accommodate accessibility renovations. Readers are encouraged to check with their community service departments to inquire about existing programs in their area.

**Financial Loans** – The Illinois Assistive Technology Program (IATP) operates an equipment loan program known as "ATLOAN$" that enable qualifying residents to finance the purchase of assistive technology devices costing between $1,000 and $30,000.

**Charitable Services** – Several Illinois organizations have begun to pilot test technical assistance programs designed to assist persons with disabilities acquire and install smart home automation devices to support independent living. One corporate example is Ameren Illinois' Accessibility Pilot Project that provides smart device installation assistance to persons with disabilities that increase independence and energy efficiency while decreasing monthly utility bills.

A similar nonprofit initiative is being piloted by the Smart Self Reliance Initiative with support from the Illinois Science & Energy Innovation Foundation, the Christopher & Dana Reeve Foundation and Google. This initiative is known as the Student Mentors Assistance Project (SMAP) which employs trained high school seniors to assist persons with disabilities with smart device installation and enrollment in smart utility pricing programs. To learn more about the Ameren Illinois pilot project, follow this link to their video overview: https://vimeo.com/389561909/74bd67f867//

To learn more about the SMAP, visit https://smartselfreliance.org/installation/

**Medicare** – While the original Medicare program does not pay for home modifications that would include smart devices, it may pay for home modifications that include assistive technology devices if they are required for medical purposes and prescribed by a doctor. Also, Medicare Part B will pay for the cost of an occupational therapist to evaluate a home to determine what modifications might be required.

**Medicare** – While Medicare is less likely to be the source of financial assistance, the privately sold Medicare Advantage or "Medicare Part C" plans offer supplemental benefits that do cover home modifications that could include smart assistive technology devices for recipients with demonstrated medical need. According to one source, benefits under these plans are likely to be expanded in the next year to include non-medical benefits for chronically ill persons
(source: payingforseniorcare.com).

**Illinois Home and Community Based Services (HCBS) Waiver Programs** – The Illinois Department of Human Services' (IDHS) Division of Developmental Disability (DD) and Division of Rehabilitation Services (DRS), and the Illinois Department on Aging (IDoA) operate statewide Home and Community Based Services (HCBS) waiver programs that may enable users to purchase some of the devices described in this guide. An individual may only be enrolled in and receive services through one HCBS waiver program at a time. Prior to making a referral for services, it is important that a user choose the most appropriate program based their individual situation.

**The IDHS-DD** division administers three HCBS waiver programs. They include the Children and Young Adults with Developmental Disabilities - Support Waiver, the Children and Young Adults with Developmental Disabilities - Residential Waiver, and the Adults with Developmental Disabilities Waiver. The HCBS programs offer approved participants with intellectual and developmental disabilities (I/DD), as part of an array of services to support independence, reimbursement for the cost of adaptive equipment. The reimbursement may also cover the cost of training and Assistive Technology service assistance.

Adaptive equipment is specified in a participant's Person Centered Plan and is defined as "(a) devices, controls, or appliances that enable participants to increase their ability to perform activities of daily living; (b) devices, controls or appliances that enable participants to perceive, control, access or communicate within the environment in which they live; and (c) such other durable equipment not available under the State Plan that is necessary to address participant functional limitations."

The Federal government defines Assistive Technology (AT) service as a service that "…assists a participant in the selection, acquisition, or use of an assistive technology device." Services may include:

- A functional evaluation of the participant and an AT needs assessment conducted at a residence,
- Assistance in purchasing and leasing AT devices,
- Customization of the AT devices for use,
- Coordination of AT device use with other therapies described in the Person Centered Plan,

- Participant and care provider training in device operation and maintenance.

To apply for a Developmental Disability Waiver, individuals with I/DD must meet with an Independent Service Coordination Agency to determine eligibility for services.

- Consult the DHS Office locator to find the nearby agency https://www.dhs.state.il.us/page.aspx?module=12

- For additional information contact: 1-888-337-5267 or 1-866-376-8446 (TTY)

**The IDHS-DRS** division's **Home Services Program (HSP)** operates 3 Home and Community Based Services (HCBS) Waiver Programs: Persons with Disabilities, Persons with Brain Injury and Persons with HIV or AIDS.

HSP offers approved individuals an array of devices or equipment purchased, repaired or rented to promote independence, prevent an increase in care, reduce or eliminate another service or ensure the individuals' health and safety in the home. Prior to being considered for adaptive equipment, assistive technology, or home modification, an individual must first qualify for and receive other services through HSP.

Adaptive Equipment and/or Assistive Technology Services may include:

- A functional evaluation of the participant and an AT needs assessment conducted in the home.

- Assistance in purchasing and leasing AT devices.

- Customization of the AT devices for use.

- Coordination of AT device use with other therapies described in the approved waiver plan.

To apply for HSP services, prospective recipients must contact:

- The Home Services Program or submit a referral for HSP services on the HSP website at:

  www.dhs.state.il.us.

- The Division of Rehabilitation Services Home Services Program through the DHS office locator at:

  https://www.dhs.state.il.us/page.aspx?module=12

- Or phone 1-877-761-9780 or 1-866-264-2149 (TTY).

The Illinois Department on Aging (IDoA) HCBS waiver program is known as the Community Care Program (CCP). Among other services, the program provides waivers to eligible seniors for automated medication dispensing (AMD) and emergency home response service (EHRS) devices.

AMD devices emit auditory, visual or voice reminders to take medications and provide tracking and caregiver notification of missed doses. The device is supported through a telephone line or wireless/cellular connection. The EHRS device is a wearable two-way voice communication unit such as a pendant or wristband and a base unit that enables the user to access a 24-hour support center that can dispatch emergency responders when needed. Eligibility requirements for these services include age – 60 years old or older; U.S. citizenship; Illinois residency; non-exempt assets of under $17,500 and a determination of need assessment.

To learn more, visit the CCP website at:
https://www2.illinois.gov/aging/programs/ccp/Pages/default.aspx

Or contact the Illinois Department on Aging Senior Helpline at 800-252-8966.

**Veterans Programs** – The Veterans Administration operates multiple grant programs (SAH, SHA and HISA Grants) to provide veterans financial assistance in making home modifications and particularly modifications that accommodate a disability whether connected to their military service or not. Veteran pensions can also be a source of financial assistance for these modifications through a one-time bonus mechanism for unreimbursed medical expenses. The nonprofit veteran advocacy organization known as “Rebuilding Together” also offers financial assistance for home modifications through its “Heroes at Home Program” that may be a valuable financial resource to consider for veterans with disabilities.

**HUD & Department of Agriculture Programs** – Both the US departments of Housing and Urban Development (HUD) and Agriculture (DOA), and their state counterparts, operate what are known as nursing home diversion initiatives that provide loan assistance for home modifications to increase the independence of persons aging in place. These may be appropriate to consider if an independent living facility includes detached or cottage housing arrangements for their residents. HUD’s initiative is the Home Improvement Loan program and the DOA’s initiative is the Rural Repair and Rehabilitation Grant program. Readers should contact their local HUD of DOA offices for more information.

# Smart Device Applications

The principal smart device applications that can benefit administrators and engineers are those that support facility hazards detection, resident and facility monitoring, equipment and fixture control, residential unit appliance control, and essential resident connections. Each application is described below.

## Hazards Detection

These devices notify residents and facility managers of hazards via alerts sent to smartphones, mobile devices, or digital assistants and include smart smoke and carbon monoxide detectors, smart leak detectors, and smart air quality sensors.

**Smart smoke & carbon monoxide detectors** send alerts to a mobile device when smoke is detected anywhere in the facility. As compared to conventional detectors that simply sound an alarm, smart detectors have built-in sensors that can be monitored and silenced from a smart phone and can be tested remotely or programmed to perform automatically scheduled tests. While standard detectors are required by law, a smart device can enhance emergency response capabilities.

**Smart leak detectors** automatically detect leaks and send alerts to mobile devices that identify the source, thereby decreasing mitigation response time and damage to the facility. Detectors with remote shutoff features enable a facility engineer to immediately stop a leak on their mobile device, from any location with a Wi-Fi signal.

**Smart air quality sensors** monitor and identify indoor air pollutants in the facility (e.g., toxins, dust, and chemicals). Units that feature air purifiers or outlets for plug-in purifiers also activate them to address pollutants without intervention of the maintenance staff. Improving indoor air quality is essential to maintain the health of residents, especially those with compromised immune systems, lung disease, or asthma.

## Resident & Facility Monitoring

Smart devices that sense human activity, detect anomalous events and send alerts to those monitoring on mobile devices include smart emergency alert devices, smart health monitoring devices, smart cameras and monitors, smart doorbells, and smart occupancy sensors.

**Smart emergency alert devices** detect resident falls or accidents and alert the care staff in an emergency on their mobile devices. Most of these devices entail the use of a wearable emergency alert transmitter embedded in watches, bracelets, necklaces, and garments that enable the user to request assistance from a facility staff member without having to take any action.

**Smart health monitoring** devices allow staff to monitor a resident's vital health signs, physical activity, and any significant changes on a mobile device. They employ sensors that monitor heart rate, blood pressure, respiration rate, blood oxygen saturation, blood glucose, skin perspiration, body temperature, and implantable cardiac device function. They also monitor overall fitness.

**Smart cameras & monitors** enable remote video surveillance of activity in the facility and provides two-way audio on mobile devices such as a smartphone or tablet. Many of these monitoring systems have the capability to record video continuously or for set periods of time, or only when motion is detected.


**Smart Doorbells** allow residents to monitor and record visitors from remote locations on smartphones, tablets, and computers. Motion detection sensors, alarms, and two-way audio features are available on many of these devices.

**Smart occupancy sensors** monitor resident's movements in their units or elsewhere in the facility. Ceiling mounted occupancy sensors have the capability to automatically turn lights on when motion is detected.


## Equipment & Fixture Control

These smart devices can remotely control facility and residential unit lighting, heating, air-conditioning, humidity, security systems, and appliances on a single mobile device or by voice-command. They overcome the challenge of having to learn the operating characteristics and commands of different software applications that manage each connected device. Some also feature voice-command operation enabling use by those with motor skill and/or visual limitations. Others can provide information on real-time weather conditions, energy consumption and utility cost information. They include smart plugs, lighting and dimmer controls, thermostats, hubs and device controllers, digital personal assistants, in-home displays, and door locks.

**Smart Plugs** can control anything that has an electrical plug. Whether lamps, fans, humidifiers, air purifiers, or electronics, smart outlets can operate them remotely from any location on a smart phone or tablet. Many of these devices can also be programmed for automatic operation.

**Smart lighting & dimmer controls** can operate lighting from any remote location on a mobile device. Safe and efficient lighting control is essential in a residential facility as falls are the leading cause of injury-related deaths among adults over 65 years of age. And, approximately one in three older adults are likely to fall at least once each year. Beyond certain health conditions and medications that impair balance, the principal cause of falls is environmental. Besides trip hazards such as loose rugs, extension cords, and slippery surfaces, the top environmental condition contributing to a fall is insufficient lighting and access to light switches. Smart lighting can address this condition and a variety of options are available to fit the specific needs of facility residents.

**Smart thermostats** learn, control, and maintain a resident's preferred room temperature on a mobile device. As a person ages, the ability to maintain a satisfactory temperature is reduced. Therefore, these devices are particularly important as they maintain safe heating, ventilation, humidity, and air-conditioning levels by utilizing temperature/climate sensors and controls without the resident's intervention.


**Hubs & Device Controllers** are central control devices that can connect to and operate all other smart devices in a residential unit or the common areas of the facility from one location. These devices significantly enhance the ease of control of multiple smart devices for lighting, space conditioning, security, and safety systems by providing a single point of access and operation.

**Digital personal assistants** allow residents to control other smart devices in their residences and enable administrators to control multiple smart devices throughout the facility by voice command. These hands-free devices are arguably the most beneficial smart devices for anyone seeking to enhance their independence, particularly residents with mobility and visual limitations.

Digital personal assistants also enable residents to make phone calls, play music, order food and grocery deliveries, receive medication reminders, weather, and news, listen to audio books, operate entertainment systems and look-up recipes and other information of interest, all by voice-command.


**In-Home displays** employ a unified software interface on a touchscreen or mobile application that allow a user to control other smart devices managing the safety, security, space conditioning, air quality, lighting, and entertainment systems within the facility. These devices provide administrators a high degree of control over all operating systems in one hand-held device. Several also provide weather information and facility energy use and cost information.

**Smart door locks** enable a resident to remotely lock and unlock their door, and receive alerts when others enter their units on a mobile device. This device significantly adds to the safety and convenience for residents and staff in the facility.

## Residential Appliance Control

These devices allow residents and staff to remotely control the operation of kitchen and laundry equipment through use of a mobile device.

**Smart refrigerators** can help track grocery purchases and facilitate re-ordering directly from a control panel located on the door. Door-mounted screens allow the user to adjust the temperatures in their refrigerator, view interior and exterior camera images, and view the inside of the refrigerator on a smartphone to see what is needed while at the grocery store.

**Smart washers, dryers, dishwashers, and ovens** can also be programmed, remotely controlled, and scheduled to operate at night or weekends when electricity is less expensive.

**Smart cook-tops/ranges** feature timers, motion detectors and automatic shut-down controls to reduce the hazard associated with use by facility residents with memory related impairments.

**Smart air quality purifiers** monitor and control the air quality and odors in a facility using advanced filtering systems that remove allergens, dust and other pollutants. These devices are particularly important for residents with compromised immune systems, lung disease, or asthma.

## Essential Resident Connections

The advent of the Coronavirus and the social distancing protocols and facility lockdowns that have become necessary, have led to extreme social isolation and depression for many residents, and a serious concern for family members and care providers. Fortunately, smart devices can provide residents and their family members, friends, and care providers an effective means of connecting and communicating with each other through the use of online social networks, chat rooms, and video conferencing on any computer or mobile device. Video conferencing technology also enables a resident to communicate with and receive treatment through telemedicine capabilities that almost any mobile device will support.

# Smart Utility Pricing Services

The section contains information on smart utility pricing services that enable residents living in individually metered housing units to achieve significant savings on their monthly electricity bills, and thereby to live more affordably.

## Smart Grid Technology


Over the past ten years, Ameren Illinois and ComEd have been upgrading their electrical distribution systems to increase operational reliability and efficiency and to enable customers to take advantage of lower utility pricing. The latter is now made possible through their deployment of a digital metering technology called a smart meter. That technology transmits a customer's hourly energy consumption to the utility, enabling it to offer hourly pricing, and programs that reduce their energy bills when they shift their heavy use to hours when energy cost less.

***A Note About Privacy*:** Given that smart meters track and transmit hourly energy consumption, administrators, facility engineers, and residents may be concerned about the privacy and the security of that information. Fortunately, transmitted data do not include customer names, addresses or social security numbers and cannot be associated with a customer's personal account information. Additionally, both Ameren Illinois and ComEd employ extensive cybersecurity measures to secure and protect the data. Should privacy remain a concern, consumers are encouraged to contact their utility provider for further assurance that their energy consumption information is secure.


Ameren Illinois and ComEd offer the following smart utility pricing services: Real-Time and Hourly Pricing Programs, Peak Time Savings or Rewards Programs, Connected Device or Home Area Network Programs, and Online Customer Accounts. They also offer traditional energy efficiency programs that can also significantly reduce both residential unit and facility utility costs. These programs are described below.

## Real-Time or Hourly Pricing Programs

These programs allow facilities and residents to purchase electricity at prices that vary by the hour based on the wholesale market price for electricity at each hour. Electricity prices are highest during peak hours of demand which are roughly from 10 a.m. to 9 p.m. during weekdays. Electricity prices then drop with demand at night and on weekends and are the lowest between the hours of 9 p.m. and 10 a.m. Customers who switch from fixed-rate pricing and enroll in these variable rate programs can save as much as 15% on their monthly electricity bills by operating major appliances such as washers, dryers, and dishwashers during off-peak hours when hourly prices are the lowest. Customers enrolled in these programs also receive pricing alerts that notify them when hourly prices are expected to be higher than usual due to predicted excessive weather events.

***Important Note:*** Although these programs provide residents with individually metered units with real opportunities to save, they are not recommended for individuals who are dependent on the continuous operation of electronic medical devices. Peak time usage of these devices would cost more than a fixed-rate pricing program for continuous use.

## Peak Time Savings or Reward Programs

These programs allow customers to receive a credit on their energy bill for voluntarily reducing electricity usage during certain peak hours during the summer when energy consumption is predicted to be exceptionally high. These time periods or "Events" typically fall between 9 a.m. and 5 p.m. between the months of June and September when air conditioning is in high demand. Enrolled customers are notified the day before a predicted event by phone, email, or text. If they reduce their energy usage below their previously recorded usage during a similar period on a non-event day (the baseline), they receive a credit. These credits are calculated at a certain dollar amount per kilowatt hour of energy reduced from the baseline for that time period.

## Connected Device or Area Network Programs

These programs are designed to enable customers to wirelessly connect certain smart devices to the utility smart meter and to use them to access detailed electricity consumption and pricing information as they perform their functions. At the present time, most of the devices equipped with the wireless communication protocol, or language that allows them to communicate with the smart meter, are in-home displays, gateways (devices that collect data from a smart meter), smart thermostats and range extenders that allow wireless devices to operate beyond the 50' distance limit from the smart meter. Both Ameren Illinois and ComEd operate a connected device service and maintain a list of smart devices that are compatible with their smart meters on their websites. This list should be consulted before purchasing a product designed to use smart meter data.

## Online Accounts

This program enables customers to view their private accounts online where they can:

- Track their hourly, daily, and monthly energy consumption,
- Establish a home energy profile and customize an energy efficiency plan,
- Set-up phone, text, and email alerts of price changes and weather events,
- Investigate a variety of energy efficiency strategies and tools, and
- Enroll in the programs described above.

## Energy Efficiency Programs

Ameren Illinois and ComEd also offer traditional energy efficiency programs that can save customers money on their utility bills. These include home energy assessments, energy efficient product rebates and discounts, free appliance pick-up and recycling services, free weatherization services, and income-eligible programs offering no-cost energy efficient products and installation services.

To learn more about these cost-savings programs, visit the utility websites below.


www.powersmartpricing.org/


www.comed.com/WaysToSave/ForYourHome/Pages/Default.aspx

# Planning & Additional Resources

## Planning & Purchase Considerations

The development of an effective plan for smart device and service use to enhance the facility operations and resident care requires administrators and engineers to carefully consider a number of key factors.
These include:

- Age range and the general and specialized physical and cognitive health of the residents and how that is likely to change in the next five to ten years,
- Physical characteristics of the facility, and existing structural or logistical impediments to establishing local area Wi-Fi networks,
- Necessary facility retrofits to accommodate establishment of Wi-Fi access in both common areas and in residential apartments or suites,
- Ability of residents to independently invest in the purchase of smart devices and related subscription services,
- Onsite capability and budget resources to install and maintain hardware and operating software to support and troubleshoot smart devices,
- Necessary staff, administration and resident training to set-up and operate selected devices and the cost and potential benefit of smart device use.

Once a plan for smart device use is developed, and preparations are made to retrofit common areas and individual residences for Wi-Fi access, smart device access and control should also be considered, and specifically which external parties will be granted access. This is particularly important for devices and applications that involve monitoring resident activities, health, and the response to emergency and hazard alerts. In addition to composing a use plan and budget for the deployment of smart devices, consideration should be given to the development of a data privacy policy as well.

***A Cautionary Note on Device Purchase:*** The authors caution against the purchase of smart devices from third-party vendors not authorized by the original equipment manufacturer (OEM) to distribute their products. Many have discovered, the hard way, that certain vendors selling devices on Amazon are not authorized distributors, though they may appear to be, and as a result, they are often selling outdated products and apps that the OEM no longer supports. To avoid this hazard, visit the OEM website to find an authorized distributor and then to that entity's website to make the purchase.

## Smart Devices by Application

The following tables provide a sample of some of the more popular smart devices on the market during the fall of 2020 and their pricing at that time. For current pricing and product availability, please visit: https://smartselfreliance.org/smart-devices/

**Hazards Detection**

| Smart Smoke & Carbon Monoxide Detectors | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Honeywell Xiaomi Mijia Alarm | Provides remote alerts to connected technologies and smartphones when smoke is detected in the home. | $30 - $40 |
| First Alert Onelink Safe & Sound Smart Hardwired Smoke & Carbon Monoxide Alarm | Alerts smart device through the Onelink app if there is a detection of smoke or carbon monoxide in the air. Has a built-in Amazon Alexa. | $245 - $255 |
| Leeo Smart Alert Smoke/Carbon Monoxide Remote Alarm | Monitors existing smoke, carbon monoxide, and water alarms and alerts you via smartphone app or phone call if there are issues. Can alert friends, family, and local emergency services of emergency detections. | $95 - $105 |
| Nest Protect Smoke and Carbon Monoxide Alarm Battery | Connects through Wi-Fi to Smart Home Technologies to alert user of smoke and/or carbon monoxide in the air. | $115 - $125 |

| Smart Leak Detectors | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Flo Leak Detection System | Provides remote automatic water shutoff through a smart phone app, gives alerts to a smartphone when maintenance is needed and performs daily tests to detect leaks and identify issues. | $490 - $500 |
| Floodie | Sends immediate alerts to a smart phone when the device detects leakage or floods. | $85 - $95 |
| Honeywell Lyric Wi-Fi Water Leak Detector | Alerts smartphone when the device detects a water leak or freeze. Connects to home Wi-Fi. | $65 - $85 |
| Samsung SmartThings Water Leak Sensor | Alerts smartphone when device detects excess water. | $20 - $30 |
| Wasserstein Smart Wi-Fi Water Sensor | Alerts smartphone when there is a present or potential water leak in a home. Connects to home Wi-Fi and provides information via the Wasserstein app on smartphones. | $25 - $55 |

| Smart Air Quality Sensors/Smart Air Purifiers | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Awair Air Quality Monitor | Monitors home air composition by tracking toxins, dust, and chemicals. Connects to home technologies such as Nest, Alexa, smartphones, and tablets to provide information feedback. | $160 - $170 |
| Flowie Waterflow Sensor | Connects to water meter to detect water use as well as air quality and humidity. | $390 - $400 |
| Foobot Air Quality Monitor | Sends data to a smartphone or tablet about home air quality. Uses colored LED lights to show the user what the air temperature, humidity, and purity is like. Connects with other Smart Home Technologies such as Nest and Amazon Echo. | $195 - $205 |
| Levoit Air Purifier and Sensor | Levoit purifies the air by ridding home air of toxins, dust, and other particles. The device provides smart feedback by suggesting specific use of fan speed to keep air cleaner. The device has a sleep mode to adjust the purifier to the needs of the user at night. | $85 - $160 |
| Wynd Wearable Air Quality Tracker | This wearable and portable technology connects to a mobile app on smartphone or tablet to monitor air quality anywhere you go. Through the app, it provides information on the level of particles in the environment such as allergens and fuels. | $75 - $80 |

## Resident & Facility Monitoring

| Smart Emergency Alert Devices | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Medical Guardian | This medical alert device can detect falls and pinpoint location to expedite help. It can be worn as a pendant or wristband. Offers six different products and plans that can be selected and customized. | Equipment: $0 - $300; Plans: $30 - $60/month |
| ADT | Includes medical protection at home or on the go. It can be worn as a pendant or wristband. Includes a fall detection feature that can get help even if the emergency button can't be pushed. Three plan options are available that include GPS location, home temperature monitoring, and 2-way talk with ADT through a base unit. An ADT lockbox to house a door key can be purchased for $30 to allow for easy access for emergency personnel. | Equipment: $0 - $15 Plans: $30 - $40/month |
| MobileHelp | Six options and plans are available that range from the basic to an in-home connection hub. May be worn as a pendant or wristband. Medical alert features include medication reminders, fall button options, monitoring services, two-way voice | Plans: $20 - $300/month |
| Medical Alert | Plans vary from a basic, affordable system to an On- the-Go + flexible system that offers GPS with location-based services | Plans: $20 - $43/month |

| Smart Health Monitoring Devices | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Apple Watch Series | Depending on the series, smart watches are offered with a variety of features in different price ranges. Options include monitoring Sp02 levels, heart rate, sleep patterns, and fitness. Includes motivation reminders and the ability to set up activity competitions with friends. With Fitness+, able to work out with fitness trainers that produce metrics to send to an iPhone, iPad, and/or Apple TV. With an ECG app, capable of generating an ECG similar to a single-lead electrocardiogram. Can generate and receive calls and texts. | Prices start at $399 |
| Coco Watch BT1 | Monitors blood oxygen, Sp02 levels, body temperature, heart rate, and sleep pattern. When anomaly is detected, alerts are sent to a care provider or family member. Includes a senior friendly interface that offers medication reminders and fitness trackers. Additional subscriptions available for advanced features such as Geo-Fencing and multiple emergency contacts. | $99.00 |

| Smart Health Monitoring Devices | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Zepp E Circle Smart Watch Health & Fitness Tracker | Tracks fitness and monitors Sp02 levels and sleep patterns. Notifications are sent to the wearer if the heart rate exceeds a recommended limit. Incoming calls, emails, messages, etc. can be received without having a phone. Sedentary reminders are sent if the wearer sits for too long. | $220.00 |
| Amazfit GTR 2 Smartwatch | Includes 3GB music storage and GPS. Monitors heart rate, sleep quality, stress level, and Sp02. Also includes the PAI health assessment system that uses algorithms to convert all complex health and activity data into a single score to help the wearer understand their physical state at a glance. | $180.00 |

| Smart Cameras & Monitors | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Amazon Cloud Security Cam | Captures video surveillance of home when away. Gives notifications of activity through a mobile app or website. Provides the viewer with two-way audio. | $115 - $125 |
| GE Wireless Digital Camera | Provides Wi-Fi activated smart security monitoring for indoor or outdoor the home. Connects to other Wi-Fi enabled devices such as a smartphone to provide video surveillance. | $80 - $125 |
| Piper nv Smart Home Security System with Night Vision | Video home security system that sends alerts to a smartphone when there is unsuspecting motion or activity. | $195 - $205 |

| Smart Occupancy Sensors | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| BeSense Zwave Ceiling PIR Motion Detector | Ceiling motion detector alerts connected technologies when someone is in the home. Connects to smart hubs to activate programmed home controls such as lighting and temperature. | $25 - $30 |
| Nest Tag | Touch the device to disarm your Nest-connected alarm system to alert the home of occupancy. | $20 - $30 |
| Philips Hue Motion Sensor | Wall mounted or freestanding device which controls lighting when someone walks into or leaves a room. | $35 - $45 |
| Samsung SmartThings Arrival Sensor | Receive an alert to your smart device when someone arrives at or leaves your home. This device can also be programmed to trigger lights or locks when a person arrives at or leaves the home. | $15 - $20 |
| Wink Door Window Sensor | Alerts your Wink Hub if doors and windows are opened, notifying the user through the Wink App if anyone has entered the home. | $25 - $35 |

| Smart Doorbells | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Nest Hello Doorbell Camera | Doorbell camera to view and interact with visitors at the door. Can view and talk to people from your smartphone or other device. | $225 - $235 |
| Ring Video Doorbell | Connects with Alexa and smartphone or tablet for Wi-Fi activated security. Has a camera to hear, speak to, or see anyone at the front door. | $95 - $500 |

## Equipment & Fixture Controls

| Smart Plugs | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Belkin Smart plug | Connects with Alexa and Google assistant to provide remote control of technologies. | $25 - $35 |
| Geeni Spot Smart Plug – Single plug | Control technologies through Google Assistant, Amazon Alexa, voice control, or through Wi-Fi connectivity to smart device. | $15 - $25 |
| Kisslink Mini Smart Plug Mini | Connects with Alexa, iOS, and Android to provide remote control of Smart Home Technologies via smartphone or device. | $10 - $25 |
| Mini Smart plug (Amazon) | Connects with Alexa and Google Smart home. | $10 - $20 |
| youxiu smart plug (Amazon) | Connects with Alexa, iOS, and Android to provide remote control of Smart Home Technologies via smartphone or device. | $10 - $20 |

| Smart Hubs & Device Controllers | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Iris Smart Hub | This Smart Hub is the heart of the Iris Network and allows control of your connected technologies using the Iris app. | $65 - $75 |
| Logitech Harmony Hub | The Logitech Harmony Hub connects with over 270,000 entertainment and smart home technologies. You will have the ability to control the Harmony Hub by using your smartphone or tablet. | $70 - $100 |
| Phillips Hue Bridge (2nd Generation) | Control lighting, adjust thermostat, or lock doors via voice commands. | $50 - $60 |
| Samsung SmartThings Hub | Connects a variety of Smart Home Technologies, compatible on App, connects with Echo, learns household behaviors by monitoring technologies at all times. | $80 - $90 |
| Wink Connected Home Hub | Connects multiple Smart Home Technologies, sets patterns and connects technologies in the house; allows for easy control via Wink App. | $25 - $35 |

| Smart Lighting & Dimmer Controls | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Cree LED Lightbulb – 4 pack | When connected to a hub, can turn on, off, and dim from remote locations via connection. | $15 - $20 |
| LIFX Mini Wi-Fi Smart LED Light Bulb – 1 pack | Connects to compatible technologies (Alexa, Android, iOS) to allow for remote control of lighting, dimming, and timing of lights. | $20 - $40 |
| Lutron Caseta Wireless Smart Lighting Dimmer Switch – 2 pack | Connects to compatible technologies (Alexa, Android, iOS) to allow for remote control of dimming and usage of lighting. | $155 - $190 |
| GE C-Sleep Lightbulb – 4 pack | Connects with Amazon Alexa or Google Assistant to control lighting from remote locations. Ability to group bulbs to control many at once. No hub required. | $65 - $75 |
| Philips Hue – 4 pack | Automated light control from home or away via app, or other Smart Technology such as Echo or Nest. | $175 - $200 |

| Smart Door Locks | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| August Wi-Fi Smart Lock | Includes an open-close sensor. Works with Siri, Google Assistant, and Alexa. Wi-Fi enables remote access to lock and unlock a door from an Android or iOS device from a remote location | $220 - $250 |
| Yale SL Touchscreen Deadbolt | Includes a keyless lock with a backlit keypad that works with Amazon, Alexa, Google Assistant, and HomeKit. A version is available that connects to other smart devices. | $260 - $300 |
| Kwikset Halo Wi-Fi Smart Lock | Can create up to 250 unique user codes for friends, family, or guests that can quickly and easily be disabled or deleted. Notifications can be sent related to a lock's activity and lock event history. Works with Alexa and Google Assistant and compatible with the Kwikset App | $170 - $230 |
| Schlage Encode Smart Wi-Fi Deadbolt | Built-in Wi-Fi allows you to lock/unlock from anywhere. Pair with the Schlage Home app or Key by Amazon app to create and manage up to 100 access codes for family, friends, and care providers. Works with Alexa. Built-in alarm technology senses potential security breaches at the lock. | $220 - $250 |

| Smart Thermostats | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Honeywell | Adjust temperature from a remote location via computer, tablet, or smartphone; creates energy savings, touchscreen, large panel visual, connects to Amazon Alexa for voice control. | $95 - $210 |
| Lux GEO | Use with or without Wi-Fi, 7-day programming, air filter monitor, and large backlit display. | $95 - $160 |
| Nest Thermostat | Adjusts temperature based on personal habits, large, clear display; efficient temperature control; connects to Amazon Alexa for voice control. | $205 - $250 |
| Sensi Touch Wi- Fi Thermostat | Smart alerts, automatic upgrades, color shift, back glow, humidity readings, brightness adjust, easy do-it-yourself installation, and a seamless smart home integration. | $145 - $170 |
| Bosch Connected Control | Weather access, 5" full-color touch screen, compatible with most HVAC systems, programmable. | $160 - $170 |
| Ecobee Smart Thermostat | Energy Star approved, alerts for sudden temperature changes, vacation mode to conserve energy, control heating and cooling from the app, offers eco+, a free software upgrade for Ecobee thermostats to enhance energy saving options | $169 - $249 |

| Digital Personal Assistants | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Amazon Echo | Responds to voice commands to control other home technologies and complete tasks such as report the weather, play music, and create calendar events. | $45 - $230 |
| Apple Home Pod | Plays music by adapting to the speaker's and user's environment. Also acts as a home assistant through the voice detecting use of Siri to answer questions and complete tasks | $295 - $350 |
| Google Home Assistant | Responds to voice commands to control other home technologies and complete tasks such as report the weather, play music, and create calendar events. | $45 - $130 |
| Insignia Voice | Voice activation plays songs for the user. Pairs to other technologies through Wi-Fi and Bluetooth. The device has a built-in Google Assistant to answer questions and access the Internet. | $45 - $55 |
| Ultimate Ears | Voice activation plays songs for the user. The device has a built-in Amazon Alexa to answer questions and complete tasks with Wi-Fi connectivity. | $190 - $250 |

| Smart In-Home Displays | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Cevia's Homeview | This Wi-Fi connected 8-inch display allows for instant home energy updates. Receive not only photos from anywhere in the world, but also alerts and messages from your utility. Homeview can monitor and control a wide variety of Smart Technology. | $140 - $160 |
| CURB Home Energy Monitoring System | Home energy monitoring system that attaches to a breaker panel to show individual appliance energy consumption. Communicates to the resident through iOS or android technologies to give updates on usage and projected costs. | $395 - $405 |
| Neurio | Home energy monitoring system that provides cost updates and notifications to a smartphone or device to better understand home energy usage and areas for savings. | $215 - $225 |
| TED Pro Home Electricity Monitor | Monitors electricity usage in the home and communicates with resident and utility company on high areas of usage and ways to cut monthly bills. Compatible with smartphones and Alexa. | $295 - $500 |
| Sense Home Smart Meter | Device that installs into home electrical panel that monitors power usage. Sends notifications to a smartphone or device about usage monitoring and changes. The device learns patterns in energy use to maximize efficiency while lowering cost. | $295 - $350 |
| Smappee | Smappee is an appliance-focused meter that monitors energy usage from technologies such as a heat pump or electric car. Via smart phone or device, Smappee provides the user with information on energy usage per individual technologies and factors. It provides alerts if there are leaks or errors in energy usage to create cost savings. | $245 - $350 |

**Residential Appliances**

| Refrigerators, Washers, Dryers, Ovens, Air Purifiers | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Behmor Smart Coffee Maker | Remote control of your coffee maker via smartphone or device. Connects with Amazon Alexa and Amazon Dash. | $165 - 175 |
| Kenmore Smart Dryer | Remote control of your dryer via smartphone or device. | $985 - $1,150 |
| LG InstaView Door in Door | Voice activation through Google Assistant, gives notifications of open door for energy efficiency. | $1,895 - $2,695 |
| Samsung Flex Duo Smart Oven | Control and monitor cooking activities through Wi- Fi connectivity. | $2,195 - $2,395 |

| Refrigerators, Washers, Dryers, Ovens, Air Purifiers | | |
|---|---|---|
| Samsung High Efficiency front-load washer | Remote control of your washer through Wi-Fi connectivity. | $995 - $1,045 |
| Levoit Smart Wi-Fi Air Purifier | Can be controlled remotely, set schedules, adjust fan speeds, etc. from your smart phone. Compatible with Amazon Alexa and Google Assistant for voice control. | $139.98 |

**Essential Resident Connection Devices**

| Communication Devices | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| The GandPad | Simple and secure tablet computer that connects a senior to their family and friends. Able to view photos and videos, play games, listen to music, check emails, make phone calls, place a video chat, etc. | Free table and case with subscription; Plans: $79/month with $29 Setup and Shipping or $696 per year if paid up front with free Setup and Shipping |
| ViewClix | Easy use and allows for family members with on-the- go lifestyles to stay connected. Can easily share pictures, enjoy live video calls, and post sticky notes to the ViewClix Frame. | $200 - $300 depending on screen size |
| FaceBook Portal | Uses FaceBook Messenger or WhatsApp to make calls. The smart camera automatically pans and zooms keeping everyone in frame while you move and talk freely. Smart sound enhances your voice while minimizing unwanted background noise | $129 - $279 |
| Amazon Echo Show | Allows calls to others who have the Alexa app or an Echo device with a screen. Works similar to a Google Nest Hub. | $45 - $155 |

| Social Media &Video Conferencing Apps | | |
|---|---|---|
| **Name** | **Features** | **Price Range** |
| Online Social Networking Services | Online platforms used to build social networks or relationships with other people who share similar interests. Examples of platforms include:<br>• FaceBook<br>• https://www.facebook.com/<br>• Instagram<br>https://www.instagram.com/<br>• Tumblr<br>https://www.tumblr.com/<br>• AARP Online Community<br>https://community.aarp.org/ | Free |
| Senior Chatrooms | This makes chat with others much easier and accessible to seniors. The site design is easy on the eyes and easy to navigate. Examples of chat rooms available specifically for seniors include:<br>• Silversurfers<br>https://www.silversurfers.com/silversurfers-forum/<br>• Buzz50<br>https://www.buzz50.com/<br>• ElderCare Online Chat<br>http://www.ec-online.net/Community/chatschedule.htm<br>• FaceBook Messenger<br>https://www.messenger.com/ | Free |
| Video Conferencing | Offers a great way to keep in touch while keeping a safe distance during the COVID pandemic. Video conferencing feels more personal than a phone call and with the right platform, it can almost feel like the participants of a video call are in the same room. Easy-to-use platforms for seniors include:<br>• Zoom<br>https://zoom.us/<br>• Skype<br>https://www.skype.com/en/<br>• FaceTime<br>An app that supports video and audio calling between Apple devices<br>• Google Hangouts<br>https://hangouts.google.com/<br><br>Compatibility with platforms vary by the command device that is used. | Free |

## Glossary of Terms

The terms contained in this glossary combine those found in glossaries complied by: CRT Labs at The National Association of Realtors, the Home Automation Glossary and Smart Grid Today. You can find their full glossaries on the following websites:

CRT Labs(https://crtlabs.org/smart-homeglossary/)

Home Automation Glossary
https://www.vesternet.com/resources/glossary);

Smart Grid Today
https://www.smartgridtoday.com/public/glossary.cfm.

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**Actuator:** A device that is triggered by a sensor.

**AirPlay:** The wireless protocol used by Apple to allow for audio and video streaming over a wireless network between compatible technologies.

**Application (APP, app):** A term used to describe an application that runs on mobile technologies such as personal smartphones and tablet computers.

**Automated or Advanced Metering Infrastructure (AMI):** A utility infrastructure with two-way communications for metering and associated systems allowing delivery of a wide variety of services and applications to the utility and customer.

**Applet:** The IFTTT Applet triggers an action or response using the IFTTT web service whenever an event occurred. (If this happens, do that) or (If this happens, do this, and then this, and then this).

**Automation:** The ability for your home or technologies to react without input from humans. For most smart homes, this is achieved by having multiple technologies communicate with each other, including sensors, cameras, and other products, to achieve varying levels of automation.

**Bluetooth LE/ Bluetooth Smart**: A wireless protocol that is popular among smart home technologies.

**Cloud-to-Cloud:** Many smart home products use cloud services for their core functionality. Although it is not ideal having your technologies relying on an Internet connection, it does sometimes allow for increased interoperability. Two technologies in the same room might not be able to communicate directly. Instead, messages are sent back and forth through their respective cloud services over the Internet. This is known as “cloud to cloud” and is becoming a popular way for hardware vendors to increase compatibility.

**coMesh Network**: Protocols that are designed using a mesh network means products can pass messages from device to device in a “hopping” fashion until the final destination is reached. Every device in your home acts as a range extender; the more technologies you have, the more powerful/ reliable your network becomes.

**Device:** A specific electronic product that can be controlled through the wireless network. The device can be a local wireless controller, which controls a specific light or appliance (usually connected to it by mains wiring), or a sensor that provides input to the network. Each device is seen as a network Node.

**Digital Home Assistants:** Digital applications that use voice recognition to aid in the control of a smart home. Amazon's Alexa, the Google Assistant, and Siri are all examples of voice assistants that are designed to control smart home technologies.

**Dimmer:** A wireless controlled device that controls the brightness, as well as the On/Off state of a local light.

**Ethernet:** Common network system using cables (wired network). This system is less common in homes, where the more convenient Wi-Fi (wireless) system is used. However, the wireless Router typically includes Ethernet sockets so that a PC or other device can be directly connected to it.

**Event:** A set of commands that is instigated following a trigger from a device or sensor. For instance, when a motion detector is tripped a light comes on.

**Gateway**: Connects home automation network to the Internet. The Gateway enables you to control the network and all the technologies on it from anywhere in the world using a computer or smartphone. It also enables your network to send and retrieve information from specific remotely located servers.

**Geofence:** A virtual perimeter for the real world. Using your Wi-Fi, Bluetooth, or GPS radios, your Smart Home software can trigger events based on your physical location. For example, you can use a geofence to automatically turn off your lights when you leave for the day.

**Groups:** A collection of individual technologies, which can be controlled as a group. For instance, a controller can switch them all on with one action, rather than having to turn on each device individually.

**Home Automation:** All aspects of adding control to your home and appliances. It can be as simple as adding remote control to a few lights or creating a more complex system that includes automatic sensors and security systems.

**Hub:** The central device that allows all the different products (lights, locks, thermostats) to work together. Most hubs will also act like a universal remote, as well as providing the tools necessary to automate your technologies.

**IFTTT:** "If This, Then That" allows users to connect multiple technologies by creating "recipes" for products that may not natively speak to each other. For instance, you can have your lights flash on and off when you need to leave work at 5 p.m. if you find yourself often late to dinner.

**Interoperability:** The ability for different smart home technologies and services to reliably work together.

**IoT (Internet of Things):** A broad term that refers to everyday technologies such as lights, thermostats, and locks that can connect to the Internet and to each other. These connected technologies can exchange data and work together, automating tasks that used to be manually performed.

**Internet Protocol IP:** A device that can send information using a computer network or the Internet. It is commonly used with security cameras.

**Load:** An electrical load is an electrical component or portion of a circuit that consumes electric power such as appliances and lights.

**Network:** Two or more connected technologies. This enables the technologies to be controlled and to communicate with each other. The reason for home automation it is typically referred to a Wireless Network as a Network.

**Pairing:** The process to add a device to a wireless network. When paired, the device can be controlled by the network.

**Portable Controller:** A network controller that can be moved around the home. These controllers are normally hand-held, and battery powered.

**Protocol:** The language that technologies use to send commands to one another. Examples of popular smart home protocols include X10, Bluetooth Low Energy, Z-wave, and ZigBee.

**Router:** Connects a local area network (LAN) to the Internet.

**Sensor:** Offers a wide variety of information that can tell you not only about things going on in your home, but also be used for home automation. Presence sensors can detect if people are in a certain area, detect motion indoors and outdoors, gather indoor environmental quality factors, and report this information to other technologies using IFTTT, a smart home hub, or other protocols to make devices like lights, fans, and heating, ventilation and air condition (HVAC) units run.

**Setpoint Temperature:** The temperature that the thermostat is set to. If the room's temperature is below the setpoint temperature, the thermostat will send a signal (or close a switch) to turn on the heating system.

**Smart Assistant:** The virtual person that “lives” in a hub to assist you such as Amazon’s Alexa or Apple’s Siri.

**Smart Grid:** A nickname for the utility power distribution grid enabled with computer technology and two-way digital communications networking.

**Smart Locks:** Technologies that connect to your existing door or dead bolt locking system and are operated via a wireless signal and controllable through an interface on a smartphone, watch or tablet.

**Smart Meter:** A utility meter for electricity, natural gas or water, usually, that always includes two-way communications technology (see AMI).

**Smart Outlets (also called 'Smart Plugs'):** An adaptor that is used for 'non-smart' technologies that allows them to be remotely controlled (either by voice or app).

**Virtual Private Network (VPN):** A method of keeping the presence of and network technologies belonging to users secure and hidden from other users on the same network infrastructure.

**Wi-Fi:** A local area network that uses high frequency radio signals to transmit and receive data over distances of a few hundred feet.

**X10:** One of the oldest protocols still used in home and building automation. Developed in the in the 1970s, it uses the power lines in your home to allow communication between technologies. This simple system is very reliable, but not as capable as modern protocols.

**Z-Wave:** A wireless communications protocol designed for home automation. It is mainly used in the residential space to provide a simple yet reliable way to wirelessly control lighting, locks, HVAC, and window treatments.

**ZigBee:** A low-cost, low-power, wireless mesh network designed to be used with technologies or sensors that had very low power consumption and did not need to send large amounts of data.

## Frequently Asked Questions

**What is the Internet of Things?**
The Internet of Things **(IoT)** is a broad term that refers to everyday devices like lights, thermostats, and locks that can connect to the Internet and to each other. These connected devices can exchange data and work together, automating tasks that used to be manually performed. By 2020, it is predicted that there will be anywhere between 26 billion to 200 billion devices connected to the Internet.

**What Is a smart home?**
A smart home is more than a collection of smart devices, and it's more than a "connected" home. One could live in a house with many smart devices that are connected to the Internet, but that wouldn't make the home a smart home. If those devices are connected to each other and working together to automate several the home's processes, we're closer to a definition of smart home most people can agree with.

**What are smart devices, and how much do they cost?**
The lights, thermostats, and more that comprise the Internet of Things are called smart devices. A by-no-means complete list of smart devices includes:

- **Thermostats** – allow you to control your home's temperature remotely and see your usage for heating and cooling. Price range: approximately $200-$250.

- **Locks** – allow you to control who has access to your home and see when they access your home, even if you're not on site. Price range: most sell for approximately $200.

- **Lights** – can be adjusted from your smart phone for comfort and brightness and can be set on a schedule. Price range: wide; anywhere from $50 to $200.

- **Plugs** – allow you to control "dumb" objects, as well as monitor energy consumption of anything plugged into them. Price range: most are about $50.

- **Cameras** – can alert you to intruders, record video, and set off a siren. Price range: between $100 and $200.

- **Smoke and CO Alarms** - will alert you (on your command device) to increased levels of carbon monoxide or the presence of smoke. Price range: about $100.

**What is a smart hub?**
A smart hub is a central device that allows all the different products (lights, locks, thermostats and more) to work together in a smart home. You need not have a hub in a home to use smart devices, but you need one if you want to truly automate the behavior of the various smart devices in your home.

**What are the benefits of smart hubs?**
Smart hubs simplify the setup and use of multiple smart devices, creating a unified experience throughout your home. A hub not only places all your devices within one app, it can chain together events that keep the residents of your home happier, healthier, and safer. For instance,

you can have your hub turn on the AC and certain lights when you're at home and turn them off – and turn on other lights – when you're away.

**How do smart hubs work?**
Smart hubs work by incorporating several device protocols – such as Bluetooth, Wi-Fi, Zigbee, and others into one product, so that these devices that usually cannot talk to each other have a place to communicate. From there, consumers can use one app, instead of many, to control multiple devices at once, without being constrained to one brand or protocol. Smart hubs are an extra investment outside of the devices themselves and are not required for most products. However, they are inexpensive and often simplify the smart home experience.

**What are the benefits of a smart home?**
The top benefits of a smart home are convenience, energy efficiency, and security. According to a 2015 survey conducted by Coldwell Banker and CNET:

- 57% of smart device owners say their devices save them time;
- 45% of smart device owners report their devices save them money; and
- 72% of smart device owners state their devices make them feel safer.

Many consumers install smart devices to be able to control their lighting with their voice, or to adjust the temperature level of their home from an app on their smartphone. Some consumers install devices that will open their garage door automatically as they pull onto their street or unlock their front door as they approach their house.

The goal is to make to make common household tasks more streamlined or automated. Other consumers enjoy the energy savings of being able to automatically disable the costly heating and cooling of their homes when they are away. There is even an entire smart home device category for home energy monitors, which can show real-time energy usage.

Knowing your home's energy profile can help you identify ways to save money. Motion detectors, smoke and CO detectors, and security cameras can work in concert to alert homeowners that something is amiss in their home. From there, you have the option to alert safety officials in your area. This technology exists today and is continuing to be improved all the time.

**What are the financial benefits of using smart home technology?**

- **Devices**: Smart thermostats can easily pay for themselves over time. In a 2015 white paper, Nest claims that use of their smart thermostat results in average savings up to 10-12 percent on heating bills and 15 percent on cooling bills. Other manufacturers claim similar benefits.

- **Insurance**: Many insurance companies offer reduced rates for homes that have smart locks, smoke alarms, and security cameras. We've seen discounts of up to 15 percent.

- **Rebates**: Gas and electric companies often pay rebates to users of smart thermostats. These rebates can exceed $100 and will cover almost half the price of a new smart thermostat.

**Who owns the data, and how is smart home device data used?**
The type of data collected will vary by device. For security devices, they may be collecting real-time video feeds; for door locks, it may be who arrives and when.

- **Who owns the data?** In general, you, the consumer will own the data. However, each vendor can vary, so it is up to the consumer to make sure they have ownership of their data.

- **How is smart device data used?** The data collected by vendors can be used in a multitude of ways, from simple analytics to advanced algorithm improvements. These results are generally used by smart device companies to improve product development and provide additional services to their customers. You should also read the vendor's privacy policy to see what they are legally allowed to do with the data. They may allow themselves to sell your data to third parties, so read carefully.

**What are the connectivity options for a smart home?**
There are many options when it comes to device connectivity, but they can generally be put into three different categories:

- **Wi-Fi**. These devices connect directly to your router or gateway and have direct access to the Internet. This makes it easy to control the device from anywhere in the world. Some drawbacks are limited battery life and a greater risk of attack from hackers.

- **Bluetooth**. These devices will talk directly to your phone and this makes them ideal for creating secure personal network. With the release of Bluetooth Low Energy (BLE), these devices can provide weeks and months of connectivity on a single battery charge. To connect these devices to the Internet for control or monitoring, it will require your phone to act as a gateway or a dedicated hub connected to the Internet.

- **IEEE 802.15.4 (Zigbee)**. This is a low energy, mesh networking protocol specifically built for device-to-device infrastructures. This protocol is the basis for Zigbee, Thread, and others. It is extremely low energy and can provide months and years of operation on battery. Generally, the only way to talk to these devices over the Internet is to use a hub.

**Can I Install Smart Home Devices Myself?**
As with any other home improvement project, some smart home projects are quick and easy, while some are time-consuming and more difficult. In almost all cases, there are physical tasks (e.g., removing dead bolts and thermostats and replacing them with their smart equivalents), as well as information technology and connection tasks (e.g., getting devices to "talk" to each other, setting up schedules).

**What are some of the challenges of a smart home?**
Today's smart home is not without its complications. Just like any emerging technology, smart home products are going through their fair share of growing pains. These problems range from occasional downtime to exposing your home network to cyber criminals. Since these new products directly affect the safety and security of your home, the bar needs to be set much higher. Current low-tech solutions (e.g., smoke alarm, light switches, deadbolts, thermostat) in the home are already near 100% reliable.

To be successful, new smart home products need that level of reliability and convenience. The heavy reliance on cloud computing means these devices may only be as dependable as your home internet connection. Lastly, there is heavy competition between large corporations for control of the smart home retail space, leading to a fragmentation of the market. This leads to consumers needing separate apps to control their lights, locks, or thermostats.

**Are there security risks associated with smart home devices?**
Issues with security and privacy are to be considered as with anything connected to the Internet. As with any account you have, the first line of defense is a strong and constantly changed password.

**Do smart devices affect the selling price of a home?**
Because smart home technology is relatively new, its effect on home prices is just beginning to be evaluated. What we *do* know, according to a 2016 Coldwell Banker smart home survey, is that homeowners are willing to invest significantly in smart home technology. Seventy-two percent of millennial homeowners say they would spend $1,500 or more to make their home smart; 44 percent say they would pay $3,000 or more to do so. Who might be willing to pay more for a home with smart technology? For parents with children, 59 percent told Coldwell Banker they would pay more for a smart home.

**What happens to a smart home & smart device when the power goes out?**
Many but not all smart devices will stop working, just like the devices, appliances and systems in any other home during a power outage. However, a number of these devices operate on batteries, like smart door locks, allowing them to continue to function, although any remote-controlled features enabled by the Internet won't work until the power is restored. Batteries in smart thermostats will also maintain the memory of programmed schedules of operation so the user doesn't need to be concerned about re-programming when the power is restored. Similarly, batteries backing up some camera systems will continue to operate locally, although Internet-enabled remote monitoring won't be available. All things considered, a smart home is no worse off than a "dumb" or non-connected home during a power outage and may be slightly better off.

## Internet Service Providers in Illinois

The information provided here includes only Internet Service Providers. Prices do not include taxes and may not reflect additional fees. Please note that some providers listed below offer plans that bundle Internet service, television, and telephone service at discounted rates.

Access AT&T (cable, DSL) provides Internet access to residents on a limited income at the maximum speed available at the address. The plan offers 5Mbps-10Mbps for $10/month and 768 Kbps-3Mbps for $5/month. The maximum monthly data plan is150GB or 1TB of data per month depending on the type and speed of service you receive. If you exceed your monthly data plan allowance, you will be charged $10 for each 50GB of data usage in excess of your data plan, even if less than 50 gigabytes are used. The service includes free installation and free in-home Wi-Fi. For more information and to apply, please visit:

https://www.att.com/shop/internet/access/#!/

AT&T also offers fiber and satellite service.

**CenturyLink (fiber)** plans start at $49/month for 100 Mbps or the fastest speed available at your home but this rate requires paperless billing. No contract is required, and rate will not increase if you keep your plan. Additional fees may include a modem with a $15/month fee or purchase at $150 and a $5 fee is added to the Wi-Fi service. You have the option to self-install the modem or pay a technician installation fee. For more information, please visit:

https://www.centurylink.com/home/

**Charter Spectrum Internet 100 (cable)** offers a plan at $49.99/month with unlimited data and maximum download speeds of up to 100Mbps. After one year of service, the plan's price increases; however, a contract is not required so you have the option of searching for a different low-cost plan. For more information, please visit: https://spectrumspecial.com/internet.html

**Frontier (DSL)** plans start at $20/month for the Simply Broadband Core for 6 Mbps with a 2-year contract. Discounts are offered to households with an annual income of less than $20,000. For more information or to apply, please visit: https://frontier.coml

**RCN (fiber)** plans are available in Chicago and offer plans for $49.99/month for 1Gbps with no contract required; however, introductory offers may be available. For more information, please visit: https://www.rcn.com/chicago/

**HughesNet (satellite)** is available for customers living in rural areas as long as there is a clear view of the southern sky. Due to the satellite connection, the service may be at a slower speed. The plans start at $50/month for 25 Mpbs with a 2-year contract. For more information or to apply, please visit: https://www.hughesnet.com

**Suddenlink (cable, fiber)** offers a plan starting at $34.99/month for 1 year for 100 Mbps. No contract is required. For more information or to apply, please visit: https://www.suddenlink.com/
**Verizon Fios (fiber, DSL)** offers a plan starting at $39.99/month for 200 Mbps with no contract required and no data cap; however, to qualify for the monthly price you must enroll in autopay. For more information, please visit: https://www.verizon.com/home/fios-fastest-internet/

**Viasat (satellite)** is a satellite plan for customers located in rural areas. The Basic 25 plan is $50/month (for two years) for 25 Mbps and unlimited data during off-peak hours. Outside of the "free zone," the data is limited to 12GB. For more information, please visit: https://www.viasat.com

**Windstream Enhanced Kinetic Internet (DSL)** offers a 1-year plan for $36/month for 200Mbps with unlimited data. After 1 year, the price increases to $45/month. There is a $35 upfront fee; however, no contract is required. For more information, please visit: https://www.windstream.com/premium-speed

**Xfinity (cable, fiber)** plans start at $20/month with a 1-year contract for 25 Mbps. A paperless bill and automatics payment are required to qualify for this price. For more information, please visit: https://www.xfinity.com/learn/internet-service

**Internet Service Provider/Plan Summary - September 2020**

| Provider/Plan | Plan Type | Data Allowance | Speed | Price | Contract Required |
|---|---|---|---|---|---|
| Access AT&T | Cable, DSL | 150GB or 1TB | 768 Kbps-10 Mbps | $5-$10/month (low income discount) | No |
| CenturyLink | Fiber | Unlimited | 100 Mbps | $49/month | No |
| Charter Spectrum Internet 100 | Cable | Unlimited | 100 Mbps | $49.99/month for 12 months and $49.99 upfront fee | No |
| Frontier | DSL | Not Provided | 6 Mbps | $20/month (low income discount) | Yes |
| RCN (Chicago only) | Fiber | Unlimited | 1 Gbps | $49.99/month | No |
| HughesNet | Satellite | Unlimited | 25 Mbps | $50.00/month | Yes |
| SuddenLink | Cable, Fiber | Unlimited | 100 Mbps | $34.99/month | No |
| Verizon Fios | Fiber | Unlimited | 200 Mbps | $39.99/month with autopay & equipment charges | No |
| Viasat Exede Basic 25 | Satellite | Unlimited during off peak hours | 25 Mbps | $50/month and $99.99 upfront fee | Yes |
| Windstream Enhanced Kinetic Internet | DSL | Unlimited | 200 Mbps | $36/month for the first 12 months then $45/month and $35 upfront fee | No |
| Xfinity | Cable, Fiber | Unlimited | 25 Mbps | $20/month paperless bill automatic payment req. | Yes |

## Additional Resources for Internet Service Providers

Whistleout is a website that allows you to make comparisons of Internet plans and providers available in your area. To review the site, please visit: https://www.whistleout.com/Internet

To examine which Internet connection and plan is best for you, please visit: https://www.whistleout.com/Internet/Guides/home-internet-types

See the following resources for providers by connection types:

- Cable : https://www.whistleout.com/Internet/Cable-Internet
- DSL: https://www.whistleout.com/Internet/Best-DSL-Internet
- Fiber: https://www.whistleout.com/Internet/Best-Fiber-Internet
- Mobile or Wireless: https://www.whistleout.com/Internet/Best-Wireless-Internet
- Satellite: https://www.whistleout.com/Internet/Satellite-Internet-Plans-Packages

# Sponsors & Authors

## Sponsor

The development of this guide was made possible through funding provided by the Illinois Science & Energy Innovation Foundation. The authors below are grateful for their support of the project.

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