

Why Uninterruptible Power Supplies are an Essential Backup Component for Today's Intelligent Transportation Systems



“Smart Cities” and the ITS technologies to support them require a dependable backup power source to ensure uptime during power outages and emergency events.

Throughout the world, cities and towns are adopting “Smart Cities” technologies as a way to improve the quality of life in their districts, neighborhoods, and communities. In particular, many cities are deploying Intelligent Transportation Systems (ITS), which help them to better manage traffic conditions and road safety, reduce congestion, increase energy efficiency, and improve the mobility of their citizens.

Some examples of ITS technologies include:

- Austin, Texas has installed AI-enabled sensors to monitor intersections and traffic corridors. Using data collected by these sensors, the city’s traffic control center can make real-time traffic planning decisions, such as implementing timing changes or rerouting traffic to less congested routes during peak hours.
- Pittsburgh, Pennsylvania is integrating Adaptive Traffic Control. AI-enabled cameras measure the speed of oncoming vehicles at busy intersections, and control the timing of traffic lights to reduce wait times.
- San Rafael, California is deploying Opticom traffic signal preemption. At various intersections, sensors detect oncoming police, fire, and emergency medical vehicles, and automatically turn the traffic lights green, allowing these vehicles to pass through the intersection without stopping.
- Cities such as Chicago, Illinois , Cleveland, Ohio , and Portland, Oregon , are deploying Traffic Signal Priority systems to give signal priority to buses at intersections.

However, ITS technology is vulnerable to power outages. When power goes down, traffic lights go dark, and variable message signs, sensors, and other ITS-enabled traffic systems go offline. At the very least, this causes congestion at intersections, which is one more problem that city control centers must deal with during the outage. In a “worst case” situation, the loss of ITS systems during an emergency may put the lives of drivers and pedestrians at risk.

Like any other technology, ITS depends on electrical power. That’s why it’s a good idea for cities and municipalities to invest in uninterruptible power supply (UPS) systems. Today, UPS devices are available that are specifically designed for use with ITS technologies. These devices can help to ensure that ITS-enabled traffic lights, signs, railroad signals, tunnel systems, emergency communications, and other traffic control devices are “always on,” even during local or statewide outages.

A smart city is a municipality that uses information and communication technologies (ICT) to increase operational efficiency. Information gained from that data is used to manage assets, resources and services efficiently; in return, that data is used to improve operations across the city.



Ordinary events such as thunderstorms, heavy rain storms, sleet, hail, or snow storms can trigger power outages.

The Causes of Power Outages

Rolling blackouts

Increasing power demands within cities have forced utility companies to occasionally implement rotating power outages, in order to maintain stability in the electrical grid. To the average citizen driver, these outages can be very frustrating. One minute, everything is fine – and the next minute, the traffic lights suddenly go out! When these rolling blackouts occur, they often leave whole subdivisions and their signalized intersections dark.

Weather events

Ordinary events such as thunderstorms, heavy rain storms, sleet, hail, or snow storms can trigger power outages. A major weather event, such as an ice storm, can cause a widespread outage that may last several days. Due to an ever-changing climate, these types of weather events are expected to increase over the next decade.

Heat waves

A heat wave can be an indirect source of an outage. When too many people turn on their air conditioners, it can cause overloaded power grids to shut down.

Natural disasters

Extreme weather events (hurricanes, tornadoes) or non-weather events (earthquakes, tidal waves) often cause widespread outages. These weather disasters are expected to increase in the foreseeable future.

Residents of cities and municipalities have come to expect continuous operation of traffic lights. It's up to local and state governments to ensure that the ITS systems that operate their traffic and roadway systems will be "always on," to handle the needs of motorists and pedestrians during outages and emergency situations.



If variable message signs go down, it may prevent traffic control centers from relaying important emergency messages to motorists that would help them to avoid dangerous areas.

The Negative Effects of Power Outages on ITS Systems

When power goes down in a neighborhood, or across a city or state, its negative effects on ITS systems are many. They include:

Increased traffic congestion

At the very least, an isolated power outage increases congestion, especially at signalized intersections where each individual car must stop at a dark signal before moving on. Ordinary motorists drive more slowly, and it takes them a longer time to reach their destination.

Delays in emergency and city services

The traffic congestion caused by power outages makes it harder for police, fire, and ambulance vehicles to get to emergency locations quickly. It can also make it harder for city vehicles to deal with the events that caused the outages. For example, an outage may increase the time it takes for snowplows and sand trucks to clear the roads following a blizzard or ice storm.

Delays in restoring power

Traffic congestion makes it harder for service vehicles from local utility companies to deal with power outages. It takes them longer to get to outage locations where they can diagnose the causes and make repairs to restore power.

Delays in mass evacuations

In extreme situations such as natural disasters, cities may be forced to evacuate citizens from urban areas. Although outages usually occur only after a disaster has struck (i.e. a hurricane knocks out power), any outages that occur before or during the disaster (i.e. during a flood) may increase the traffic congestion that is normally caused by mass evacuations.

The loss of ITS-enabled technologies can also result in a loss of communications that may put the lives of citizens in danger. For example, if variable message signs go down, it may prevent traffic control centers from relaying important emergency messages to motorists that would help them to avoid dangerous areas.

Loss of real-time data and analytics

Power outages mean that ITS systems temporarily lose their ability to collect traffic data. This can have a negative effect on real-time analysis and immediate response capabilities. For example, when traffic detection systems go down, city control centers lose their ability to identify areas of high traffic congestion, and thus may lose their ability to re-route emergency service vehicles through less-congested alternate routes.

UPS Systems for ITS Technologies

The UPStealth® 2 is an Uninterruptible Power Supply (UPS), a device that is specifically designed to provide extended power delivery to traffic signals and other ITS equipment. If local utility power shuts down, the UPStealth® 2 immediately switches the traffic signal over to nickel-zinc battery backup power. It can then operate the traffic signal for 1 to 24+ hours, or until utility power is restored.

Until now, UPS systems were mainly used to ensure uptime in IT and telecom applications, such as data centers, server rooms, and Wi-fi or cell phone towers. But now, UPS systems are being deployed to ensure uptime for ITS and other Smart Cities technologies, and batteries are being developed specifically for use with ITS-focused UPS systems.

The UPStealth® 2 was designed by traffic engineers. It can be installed in existing traffic control cabinets holding ITS equipment, and can either be rack-mounted in 19" EIA racks or shelf-mounted. Once installed, the UPStealth® 2 is a self-maintaining system that requires little or no maintenance.



Nickel-Zinc Battery Benefits

Safe

More than 90% of the content of a nickel-zinc battery is recyclable. Compared to traditional lead acid and lithium-ion batteries, the nickel-zinc battery has a substantially lower Green House Gas (GHG) footprint and climate impact.

Sustainable

Unlike other types of batteries, nickel-zinc batteries have no risk of thermal runaway (a condition in which the battery is heated or overcharged to the point where it explodes). The nickel-zinc chemistry is a non-flammable alkaline chemistry and is not susceptible to battery sulfation.



UPStealth® 2 Battery Module 500W

The Nickel-Zinc Battery

When a power outage occurs, a UPS device automatically switches over to a string of batteries that serve as the temporary power source for mission-critical equipment at that site. Most UPS systems use either lead acid or lithium-ion batteries. However, the UPStealth® 2 for ITS applications uses a unique nickel-zinc battery, which offers the following advantages:

Superior Performance

Nickel-zinc power and energy density enables high discharge rates. The batteries can be recharged in 4.5 hours or less.

Longer Operating Life

Nickel-zinc batteries have a longer cycle life, meaning they can be discharged and recharged thousands of times before the battery reaches the end of its useful life. The batteries have a five-year warranty and are designed to last up to 10 years.

Smaller Size and Weight

The nickel-zinc battery is half the size and weight of traditional lead acid batteries, which makes it easier to move and carry to various locations. Also, the battery has a compact, flat form factor, and can easily be installed in the open spaces available in curbside controller cabinets.

Temperature Durability

Unlike lead acid batteries, nickel-zinc batteries can withstand extreme hot and cold temperatures. Again, this makes them ideal for use in traffic control or ITS cabinets.

UPStealth® 2 Series of Products

UPStealth 2 Battery Panel 500W



UPStealth 2 Battery Module 500W



UPStealth 2 UPS 1000W & 1500W



UPStealth 2 XRT Battery 3600W



UPStealth 2 PIM



Benefits of the UPStealth® 2 with Nickel-Zinc Batteries

-  **Traffic Safety**

By providing extended power delivery during an outage, the UPStealth® 2 ensures continuous operation of traffic lights and other ITS equipment. This enables continued traffic flow, reduces congestion, and helps ensure the safety of motorists, pedestrians, and emergency vehicles.
-  **Reliability**

With superior performance, the UPStealth® 2 is a reliable source of uninterruptible power for ITS equipment. It is currently used and trusted by over 200 Departments of Transportation, in city and municipal governments throughout the U.S. and Canada.
-  **Durability**

Accompanied by the nickel-zinc batteries, the UPStealth® 2 is able to remain operational for years and requires little or no maintenance. As mentioned, the durable UPS device and batteries can be installed in outdoor traffic control cabinets, and their operation will not be affected by extreme hot or cold temperatures.
-  **Smart Technology**

The UPStealth® 2 provides active power supervision of incoming utility AC line power, a digital battery management system, an inverter, and system control functions.
-  **Low TCO**

The fact that the UPStealth® 2 is a maintenance-free UPS system provides a huge savings in maintenance fees, making it a low TCO solution.

The Peace of Mind of “Always-On” Traffic Systems

The biggest advantage of using the UPStealth® 2 with your ITS systems is the peace of mind it gives you. In the event of an outage, you know that your city’s traffic signals will continue to work properly, allowing traffic to continue without significant interruption. Motorists and pedestrians will be kept relatively safe, and emergency and utility vehicles will not be inhibited by slow traffic flow or by wait times at intersections. By assuring that your ITS traffic systems are “always on,” your city government will have one less problem to worry about when dealing with a power outage or emergency situation.



UPStealth® 2 is compatible with NEMA & 170 Cabinets

About ZincFive, Inc.

ZincFive is the world leader in innovation and delivery of nickel-zinc batteries, applying transformational technology and solutions that provide the power to advance the world with less harmful impacts. With more than 90 patents awarded, ZincFive leverages safe, sustainable nickel-zinc chemistry within its solutions to provide high power density and performance simultaneous with superior safety and environmental advantages.

For more information, visit www.zincfive.com

Product information, visit www.zincfive.com/products/upstealth/

Contact ZincFive

See how our nickel-zinc UPStealth® series provides safe, reliable power solutions for intelligent transportation systems.

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