



CASE STUDY

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# Verizon

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Building One of the  
Largest Drone Programs  
in the U.S. with Skyward





Verizon is always looking for ways to advance technological innovation, reduce expenses, and improve worker safety as it maintains thousands of cell towers and rolls out new technologies like 5G. In 2017, Verizon acquired Skyward, a commercial drone operations management software company, to help meet this goal. Verizon leveraged Skyward and other aviation expertise to develop a strong internal drone program — one of the largest in the U.S.

Today, Verizon uses Skyward to train its drone teams and manage every drone flight across the company — and to offer drone management services to the industry at large. Together, Skyward and Verizon are enabling drones to connect to cellular networks, a capability poised to revolutionize the drone industry.

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#### DRONE PROGRAM FACTS

## VERIZON

#### AS OF JULY 2021:

Pilots: 210+

Fleet: 220 drones

Flights: 7,500+

Business units using drones: 14

#### KEY USE CASES

Vertical infrastructure inspection

Bird nest inspection

Land surveying

Disaster response

Line of sight surveying

Photography

Videography

Event coverage

Photogrammetry

5G testing

Thermal surveying

Fiber inspection

Drone innovation testing

**PART I:**

# How Verizon Launched a Nationwide Drone Program

In 2016, Verizon began to explore what it would take to launch a successful drone program. Verizon employees had often expressed curiosity about putting drones to work on the job. One Verizon business unit even began to operate a program using drones to create video content and gather news. But to establish a successful nationwide drone program, formal structure and oversight would need to be established.

## Verizon acquires Skyward

In February 2017, Verizon acquired Skyward, a startup focused on enterprise drone management software and professional services.

Verizon began managing all of its drone operations in Skyward's Aviation Management Platform. Skyward houses all operating information in this one digital system, including pre-flight planning, airspace access, mission approval, equipment management, risk assessment, flight logging, reporting, and more. Even with hundreds of pilots, Verizon executives can see every drone operation across the enterprise, from a high-level overview down to individual flights.

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“Verizon definitely thought ahead when they purchased Skyward.”

— *Matt Tuck*, Sr. Manager,  
Network Engineering & Operations, Verizon

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## Establishing policies, procedures, and management

In late 2017, Verizon released its internal drone policy, establishing one source of truth for anyone interested in flying drones for the company. It specified how drone use would be regulated and how business units could apply for permission to set up a drone team. Firm policies and standard operating procedures enabled Verizon's drone program to get off the ground while setting clear boundaries. The new drone program had central management beneath Verizon's corporate aviation department.

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"A drone looks like a cool toy, but it's a tool. And it's another tool that we have in our toolkit in order to help us serve the customers quicker."

— *Gennie Barr*, Sr. Manager, Network Operations, Verizon

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At the same time, Verizon offered individual drone teams a high level of autonomy, allowing them to perform the missions required by their business needs. While central policies and accountability promoted high-quality programs, each business unit was empowered to organically support its own individual use cases.



## Expanding a drone program across the nation

Additional teams across Verizon began launching drone programs, and the company quickly saw widespread adoption. But with rapid growth, the centralized aspects of Verizon's drone program became too much for a small group to manage alone.

Verizon set up a Drone Steering Committee with buy-in at the Executive VP level to promote growth and development across Verizon's drone program. The Drone Steering Committee helped streamline the launch of new drone teams and prioritized safety and incident reporting across the whole organization. The Drone Steering Committee eventually transitioned into the Aviation Steering Committee, which helps to manage the company's drone operations alongside its other aviation programs.

In 2020, Verizon grew its drone program by more than 95 pilots, with more than a 250% increase in flights and operations logged. This growth was enabled by strong central policies along with autonomy at the team level. Verizon continues to expand their programs rapidly today.

## PART II:

# A Closer Look: Verizon Network Assurance

More than 75% of Verizon's drone pilots belong to the Verizon Network Assurance team, which ensures that Verizon's networks are operating reliably and providing optimal service to customers. With 21 subgroups across the nation, Verizon Network Assurance's 150+ drone pilots have collectively accrued more than 5,600 flights and more than 1,300 flight hours as of July 2021.

Verizon Network Assurance initially put drones to work for tower inspections, quickly finding a strong return on investment. As the drone program found success in its first market, Verizon Network Assurance began to rapidly expand the program across the country and add new use cases.

## Managing drone ops with Skyward

In the beginning, oversight within the Verizon Network Assurance drone program was a significant challenge. Despite great use cases and growth opportunities, their management processes were inadequate to scale an enterprise drone program.

"Our program legitimately started with spreadsheets," said Matt Tuck, Sr. Manager of Network Engineering & Operations at Verizon. "Not having full information on what exactly is happening — that's not going to work on the scale that we're talking about, because we're growing a national program, not a little pocket program."

When Verizon Network Assurance started to use Skyward's Aviation Management Platform, they found it was the tool they needed to manage a growing program. With subgroups flying a variety of jobs around the country, and with the number of drone flights doubling year over year, it was essential to establish strong centralized management and top-down support.

“As a group, we log everything through the Skyward platform,” said Matt Tuck. “I can easily pull a report, take a look at the flights, and see the type of flight being exercised. Going from spreadsheets to an automated reporting system, where everything is housed in one central place, is super important.”

## Putting drones to work

The Verizon Network Assurance team puts drones to work on a wide variety of use cases.

- **Tower-top troubleshooting** – inspecting the tops of cell towers, which reduces the number of tower climbs, improves efficiency, reduces risk, and saves money
- **Bird nest inspection** – checking for bird nests on cell towers before climbing to ensure proper protection for any nests and comply with any relevant conservation laws
- **Quality assurance** – inspecting new towers or components to ensure the equipment was installed properly
- **Road access safety** – determining whether a crew will be able to access remote tower sites before deploying
- **Microwave line of sight verification** – checking key pieces of equipment for obstructions or interference

Disaster response has also become a major use case, especially in severe weather situations. Verizon uses drones to quickly inspect cell towers and equipment for damage following storms such as hurricanes. This can speed up the time it takes to restore communications services to an area after a severe weather event.

“Examples like this are creating immediate disaster response value,” said Matt Tuck. “How do we get the network back quickly? How do we make it so the customers can get in touch with their families to tell them they’re safe or let them know if they have needs?”

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## Achieving returns on investment

Verizon Network Assurance has seen significant return on investment in their drone program. While some use cases open up new capabilities that weren't economical or even possible before, other use cases replace legacy processes, with measurable results.

Prior to using drones, all tower repairs required climbers to ascend the tower twice: once to inspect the tower and determine any necessary repairs, and again to perform those repairs. Today, Verizon's drones can provide accurate, detailed inspections of towers at a fraction of the speed and cost. And while drones can't perform tower repairs, they can help climbers understand exactly what to expect ahead of time, improving safety and efficiency for tower climbs.

The total cost every time a technician has to be dispatched to climb a tower is roughly \$1,200. Using this estimate, in 2020 Verizon Network Assurance saved roughly \$850,000 using drones to reduce the required number of tower climbs. And that's not to mention the huge improvements in safety when sending up a drone instead of a human climber.

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“Any time we can reduce a tower climb, we've effectively done two things: #1 we've saved cost, and #2 we've made it a little bit safer.”

— *Matt Tuck, Sr. Manager,*  
Network Engineering & Operations, Verizon

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## Looking to the future

Additionally, Verizon Network Assurance has been actively experimenting with using drones for:

- 5G coverage analysis
- 3D modeling of assets, such as small cell sites, antennas, and other network infrastructure
- System performance call testing
- Tethered cell sites
- Thermal inspection after wildfires

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“We’ve got this great vision for where we’re going. It’s going to take a little while to get there, but that vision is fantastic.”

— *Matt Tuck, Sr. Manager,  
Network Engineering & Operations, Verizon*

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As technology and regulations continue to progress, Verizon Network Assurance is interested in using drones for:

- Applying Artificial Intelligence (AI) and Machine Learning (ML) to flights and tower inspections
- Expanded applications of thermal sensors
- Flying cell sites providing 5G Ultra Wideband coverage
- Aerial cell repeaters
- Untethered flying cell sites
- Remote deployments with drone-in-a-box or docked drone solutions
- Delivery solutions for internal use cases and emergency response

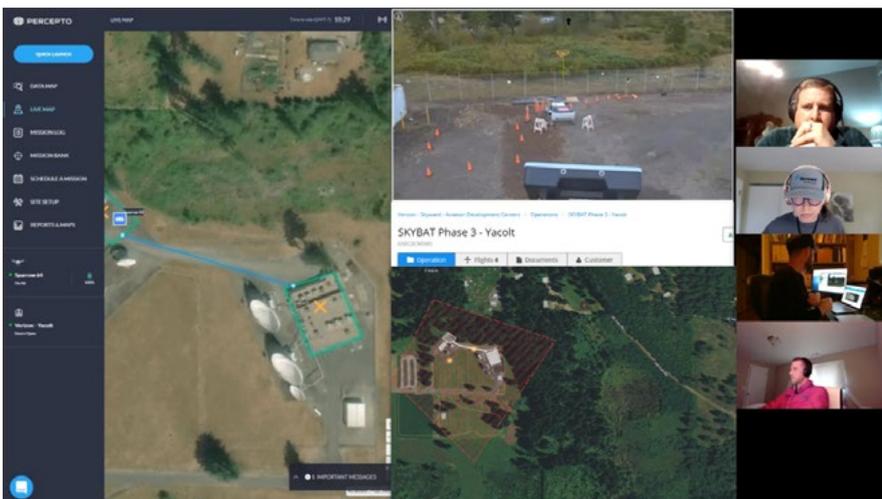


## PART III:

# Cellular-connected Drones: Verizon, Skyward, and Wildfire Response

Verizon is committed to moving the drone industry forward by connecting drones to 4G LTE and 5G cellular networks. Verizon believes that providing remote command and control of drones over cellular networks will enable the operations of the future, such as flights beyond the visual line of sight (BVLOS) of the drone operator, remote deployments, and rapid data transfer.

To accelerate the development of BVLOS operations and connected drones at scale, Verizon established Skyward's Aviation Development Center (ADC). Powered by Verizon network infrastructure, the Aviation Development Center is staffed by a dedicated team of aviators with decades of experience in military, civil, and drone aviation.



The Aviation Development Center tests and deploys drones connected to Verizon's cellular networks with the end goal of enabling Universal Traffic Management and other future capabilities. Today, connectivity is already enabling remote drone missions that would be impossible to complete any other way.



## Background: Responding to the Big Hollow wildfire

In September 2020, the Big Hollow wildfire burned more than 24,000 acres in Washington, causing mandatory evacuation orders in the area. A Verizon site hosting essential communications infrastructure was just blocks from a Level 1 evacuation order and air quality was unsafe for humans.

Verizon wanted to ensure its infrastructure wasn't impacted by the disaster, but had no personnel onsite due to the dangerous conditions. Skyward had also been using this Verizon site as a drone testing area. In preparation for crises such as this, Skyward had spent more than a year testing and proving it could safely fly without onsite personnel.

Skyward's Director of Aviation Development Centers, whose name is X, explained that Skyward built out a BVLOS capability by combining several technologies. It includes "a remotely deployable drone system, weather monitoring systems like those used at airports, Skyward's Aviation Management Platform, and state-of-the-art airborne safety systems that allow us to check the surrounding airspace for other aircraft." Crucially, they all functioned remotely because "Verizon's 4G LTE network connected these systems."

## Getting a BVLOS waiver

Because BVLOS flights require a waiver from the Federal Aviation Administration (FAA), Verizon applied for a waiver that would allow Skyward to remotely deploy the drone and check the status of the infrastructure. Under normal circumstances, this waiver is time-consuming and difficult to obtain, and even with a waiver allowing the pilot to operate the drone BVLOS, the FAA usually still requires other personnel to be on site as visual observers of the operation.

However, since the Big Hollow fire was an emergency that threatened critical infrastructure, Verizon was able to apply for an expedited waiver from the FAA through the Special Governmental Interest process. The FAA granted Verizon and Skyward a temporary waiver allowing for BVLOS drone operations with no personnel on site. The waiver also permitted operations 24 hours a day and with less than 3 miles of visibility.

## The first true BVLOS flight

Under the waiver, Skyward Aviation Development Center pilots remotely deployed the Percepto Sparrow drone to inspect critical communications infrastructure. The drone was connected to Verizon's 4G LTE network, allowing the ADC team to control the flight from their home offices, dozens of miles away from the fire. The team's operations lead, stationed in Alaska, received a near real-time feed of the operation from 1,600 miles away.

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“Innovations in airborne technology have enhanced our ability to inspect our sites without putting engineers in harm's way, and provide our first responders with reliable communications.”

— *Rima Qureshi*, Chief Strategy Officer, Verizon

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This was a milestone for remote deployment of drones in the U.S., and it allowed Verizon to maintain the quality and performance of its network as it provided critical communication services to consumers and first responders. The operation not only allowed Verizon engineers to confirm the integrity and operability of its infrastructure was not impacted, it also allowed them to do so without putting people in harm's way.

## Verizon cellular connectivity for drones

In 2021, Skyward and Verizon, along with drone manufacturer Parrot, launched the world's first drone powered by Verizon 4G LTE. Verizon's 4G LTE network spans more than 2.68 million square miles from coast to coast across the U.S., and it consistently wins top awards for network reliability. Skyward is also testing 5G drone connectivity, working to enable next-generation use cases.

In addition, Skyward is working with both the FAA and FCC to collect and analyze relevant data for drone connectivity. This work, along with Verizon's network expertise, will help Verizon propose standards for drone operations over commercial wireless spectrum. Enabling command and control over cellular networks will unlock the potential of complex drone operations such as universal traffic management (UTM), operations where one pilot operates more than one drone, and routine flights beyond the pilot's visual line of sight.

Skyward and Verizon are charting the future of drone connectivity. The goal is to provide the next level of operational control — the automation that makes drone flights safer, easier, and delivers more value to customers.

Learn how Skyward's connectivity, software, and training can help you launch and innovate with your drone program at [skyward.io](https://skyward.io)

Skyward can help you take your drone program further, faster.