

## How Far Can a Drone Fly (from the Controller)?



How far a drone can fly from the controller while still maintaining a viable signal is called the drone's range. Each model of drone has an advertised flight range, which may or may not play out in real life situations, but gives a pretty good idea as to what you can expect. But the physical limits of your drone's range must give way to the legal requirement to keep your drone in sight at all times during flight.

**While a toy drone might have a range of about 20 to 100 yards, a high-end consumer drone can have a range of about 2.5 to 4.5 miles (4 – 8km). Mid-level consumer drones will typically have a range of about 0.25 to 1.5 miles (400m – 3km).**

The specific range of your drone depends on the strength of the controller signal and the type of transmitting technology used. Unsurprisingly, more expensive drones will generally offer a longer range. For most recreational uses, however, you'll have trouble reaching the limit of your controller

signal without first going way beyond your visual line of sight, which is a big no-no under FAA regulations. Notwithstanding, there are some other good reasons to opt for a stronger controller signal.

## The Controller Range

When you say drone, it's not a one size fits all term. They come in all shapes and sizes, and as such, they come with a wide variation in terms of how far away it can get from the controller and stay on speaking terms. **You can't expect to get very far away at all with a toy drone**, certainly not more than a football field, and probably much less than that.

With a bump in price and controller signal strength, **a mid-level consumer drone will get you a good bit more range**. With a drone costing somewhere between \$150-\$500, you're looking at **a quarter mile to a mile and half** of distance that you can fly the drone away from you before starting to lose signal.

**Higher-end drones** that are starting to be in the prosumer price level and quality can get you some serious long range capability. For \$800-\$1,500 you can get a drone that **can keep a signal with its controller for 2.5 to nearly 5 miles**. That's probably well beyond how far you can keep a good visual on the drone in most situations.

By way of example, here are some drones in each category with their controller range.

	Flight Range	Flight Time
Holy Stone HS210 Mini Drone	50m	7 min.
SIMREX X300C Mini Drone	45m	8 min.
Altair Outlaw SE	400m	15 min.
Holy Stone HS720 Foldable GPS Drone	1km	26 min.
DJI Mavic Mini	4km	20 min.
Autel Robotics EVO Drone	7km	30 min.

	Flight Range	Flight Time
DJI Phantom 4 Pro V2.0	8km	30 min.
Autel Robotics EVO II	9km	40 min.
DJI Mini 2	10km	31 min.
DJI Mavic 2 Pro	10km	31 min.

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## The Visual Line of Sight Limitation

Even if your drone can keep contact with its controller at the distance of 4 miles, it's doubtful whether you can still see it clearly enough to know whether it's responding appropriately to your controls. Why does it matter?

For one thing, it's a matter of safety. If you can't physically see your drone (ie, it's not within your visual line of sight), you can't readily tell whether it's about to crash into something, or if it is going left when you tell it to go right. An out of control drone is a danger to people, buildings, vehicles and itself.

For this reason, the **FAA guidelines for safe operation of drones for recreational use require that you keep the drone within your visual line of sight**. How far you can physically keep a clear view on your drone will depend on the terrain, nearby obstacles and air conditions. But realistically with an unobstructed view, **you can only really clearly see your drone from about 1,500-2000 feet away**. That's less than half a mile. And at that distance, you're going to have a hard time telling your drone from a bird.

So if you have to keep your drone within a mile's range or less in order to have a good visual on it, what's the point of having a drone with a longer range than that? There are several good reasons.

## Uses for Long Range Drones

Long range drones that can travel 3-4 miles from the controller and the operator have very practical uses in a variety of industries. Because of the commercial demand for drones that can fly farther than the pilot can physically see them, licensed drone pilots can apply for a waiver from the FAA to operate BVLOS (beyond visual line of sight).

## Agriculture

For farmers scouting a field, a drone that can travel the entire field, reaching 3-4 miles away from the controller, is absolutely basic. Pre-planned flight path settings make it easy to have the drone cover the entire space without needing the operator to keep the drone in sight. Long battery flight times also ensure that the drone can cover the whole field in one go, then return to the take off point when the course is finished.

## Mapping

Similarly, when used for mapping, drones need to cover a large amount of territory, and can do this most effectively when they can travel far beyond the range the operator can see. Long range drones can cover a large area to capture data for making highly detailed, and even 3D maps.

## Safety & Security

For perimeter security at large construction sites, prisons or commercial warehouses, a drone that can cover the entire perimeter will likely need to leave the visual line of sight of the operator. Likewise, public safety agencies tracking suspects, or performing search and rescue missions need a drone that can fly far beyond the starting point.

## Package Delivery

For this nascent industry, drones need to have a range of several miles to make delivery by drone a reasonably viable operation. Whether leaving from a warehouse, or deployed from a delivery truck, it needs to be able to get a few miles away to the delivery location. Automated flight planning will virtually eliminate the need for an operator to keep eyes on the drone.

## Recreational Benefits of a Long Range Drone

Even if you're not planning to map miles of territory with a drone, having a drone with longer range capability is not only for the professionals. Keep in mind that a drone with a more powerful signal transmission is likely to be able to keep a stronger signal even at a closer range. A stronger signal and more powerful transmission can help to compensate for other factors that might otherwise interfere

with either the controller connection or the video transfer signal. This means that while you might not be taking a long range drone for long range missions as a hobbyist, it could be the answer for video stutter or latency issues in the closer range.

## What Happens When the Drone Gets Out of Range?

It's worth noting here that for most consumer drones, there are two different ranges to keep in mind: the controller range and the video signal range. The controller usually operates on the 2.4GHz range and will carry farther than the live video feed signal, which operates on the 5.8GHz range. This means that you will lose your video feed long before your drone will lose connection with the controller.

When you lose your video feed, it will be fairly clear, as the image on screen will begin to stutter, and then fail altogether. Don't panic, because your drone should still be responsive to your controls. You won't be able to see through the screen what's near your drone, so that's one of the reasons to make sure you're not going beyond visual line of sight. Just hit the return to home button, or manually bring your drone a bit closer to yourself to pick up the video feed again.

When your drone reaches the outer limit of the controller range, there are a couple things that could happen:

- **The drone will automatically return to home.** Best case scenario, and for most GPS drones, this is the built-in failsafe.
- **The drone will stop and hover in mid air.** This can give you a chance to move yourself closer to the drone to pick up the controller signal again.
- **The drone will land wherever it is.** This is fine unless you flew out over water, or are flying in difficult to reach terrain.
- **The drone will keep flying away** (a flyaway drone situation). The least likely scenario for most decent drones, unless you have disabled failsafe settings.
- **The drone will crash into something.** This could happen if the return to home function is activated and there are obstacles in the way. Or it could happen as a result of a flyaway.

Rather than finding out what happens first hand when you get out of operating range, it's best to know your drone's limits, and take a preventative approach.

# How to Increase Your Drone's Range

If you really need to get better range from the drone you already have, whether it's to be able to fly farther away, or to overcome other types of interference in your location, there are a few things you can try.

1. Make sure your drone's **firmware settings** are set to the FCC limits, rather than the CE limits (Europe) to get the best possible operating range.
2. Add an **antenna extender** and/or a better antenna to your controller. Also add a more powerful receiver on your drone.
3. Invest in a **range extender**. It won't break the bank, but could get you a significant jump in operating range.

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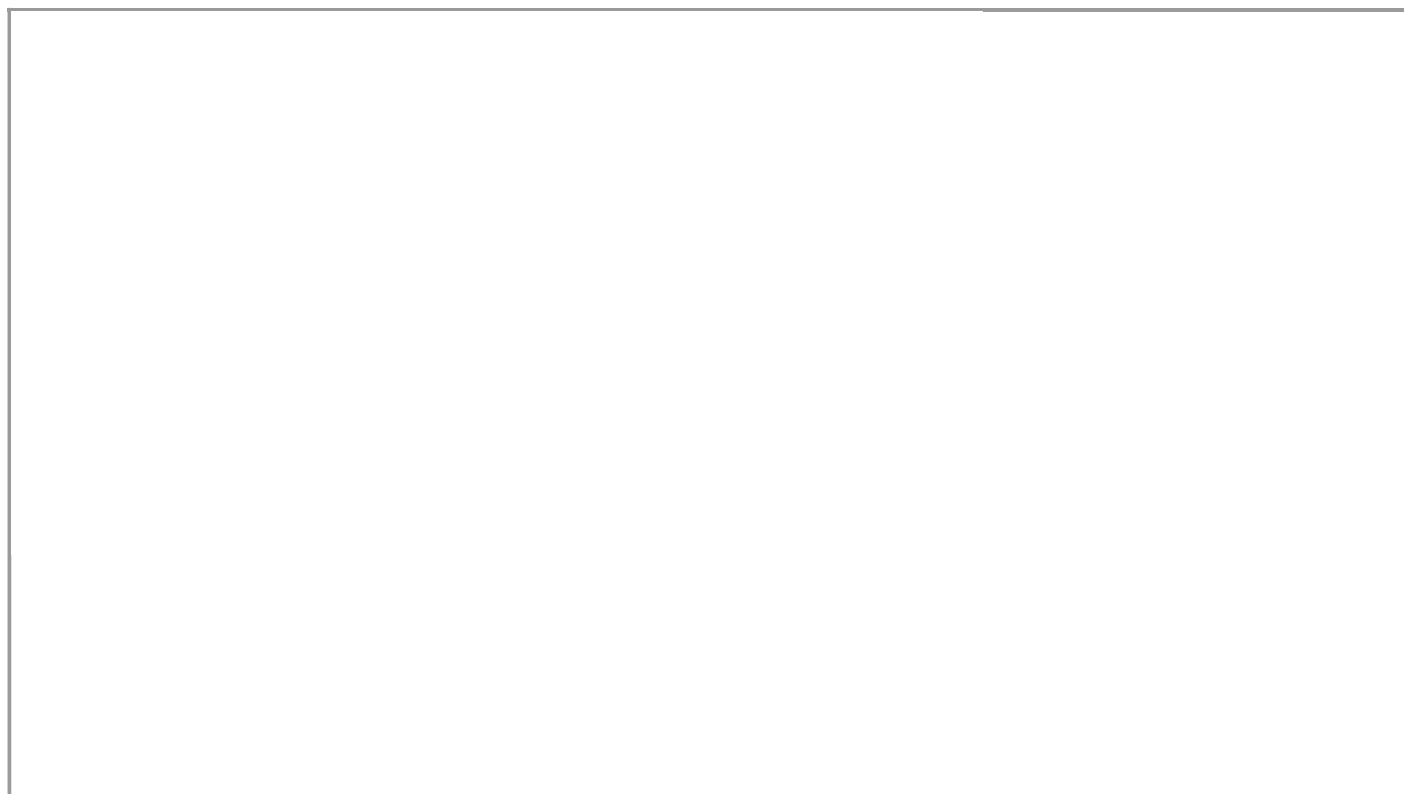
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