

**Invention Title**

Cable plant repair via drones

**Invention Summary**

This invention describes ways in which cable plant equipment could be repaired in the field using drones. It involves drones attached with landing / gripping gear and a robotic arm to perform mechanical tasks. The extra power required by the drone during such an operation could be supplied via an external detachable probe, which can supply power during the operation. Three of these invention combine drones with robotics.

**Invention Description**

use drone with robotic arms and external power attachments to repair equipment.**Invention**

**Commercial Value/Customers**

cable MSOs and wireless service providers

See attachment.

# Cable plant repair via drones

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## **Abstract:**

This invention describes ways in which cable plant equipment could be repaired in the field using drones. It involves drones attached with landing / gripping gear and a robotic arm to perform mechanical tasks. The extra power required by the drone during such an operation could be supplied via an external detachable probe, which can supply power during the operation.

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## **Invention Disclosure 1:**

Cable Plants have multiple stationary units that house cables (coax, fiber) and other equipment that often breaks down or performs sub-optimally due to a mechanical or part failure. A drone could be sent to identify and then repair such an instance. These instances can be (but not limited to)

1. Opening / closing a equipment housing box,
2. Visually inspecting the equipment
3. Attaching appropriate probes to detect exact issue
4. Figuring out next repair set (autonomously, or via remote database)
5. Tightening / loosening mechanical nuts and connectors related to cable equipment
6. Tightening / loosening electronic / electrical connectors related to cable equipment
7. Extracting and replacing parts that may be malfunctioning.
8. Performing additional custom tasks as desired by a remotely located technician.

## **Invention Disclosure 2:**

Some of the above mentioned functions could be performed while the drone is flying. Some of these may need to be performed using additional force, which may not be available during the flying state. Hence methods need to be adapted to mechanically immobilize the main frame of the drone so that its robotic arm can use some additional leverage. These methods could use

1. Mechanical claws
2. Mechanical clamps
3. Simple groove based landing pad where a drone would land its legs, so that any rotation of the drone gets disabled.

4. A simple mechanical lock that prevents the drone from getting lifted up when the mechanical arm exercises any force on the component below.

### **Invention Disclose 3:**

Since the robotic arm may require additional power at this point, a method needs to be in place for drone to attach / detach to external power source. This could be in the form of (but not limited to):

1. Conducting connector in one of the landing legs / rods of the drone.
2. An externally (retractable) chord (with magnetic tips) that drops on top of the power source and latches on to make the connection.
3. Since the power connector on the landing equipment needs to be weather protected, it could be located inside the housing. In that case, the robotic arm first attempts to take its power chord and connect to the external power source.
4. The power chord should come off easily and drone in its flying state should have sufficient power to snap the connection mechanically, if required. This will prevent drone from getting trapped via its chord.