

# CD and drone applications

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# What is a drone?

- Un-manned device

- Remote controlled
- Autonomous
- Also known as UAV (unmanned aerial vehicle)
- UAS (unmanned aircraft system)

- Purpose

- Military
- Civilian (aerial photography, monitoring of land events, weather etc.)
- Leisure (drone racing etc.)

# How does radio assist drones?

- Flight control
  - Sending control commands
  - Position Feedback (Video feed etc.)
  - Initiating emergency procedures.
  - Information on conditions of the aircraft
- Sensor data acquisition
  - Relaying data from onboard sensors.

# What are the radio challenges?

- **High data rates**
  - Drones need to relay back all kinds of information related to navigation and data from sensors.
  - Need to use higher frequency bands – more bandwidth available.
- **Long range**
  - The ground controller maybe many kms away.
  - Smaller drones mean their antennas also need to be small.
  - Extend communication by making use of existing backhaul networks.
- **Two way communication**
  - As well as flight control commands, a drone needs to relay information back. This requires use of transceivers.
- **Interference**
  - Signals to and from drones can be weak. It can suffer interference from stronger signals. Likewise drone itself can produce interference.
- **Directionality**
  - The ground station and drone are constantly changing position and orientation making communication inconsistent. Omnidirectional antennas needed.

# Why our low power narrowband modules are difficult for drones

- Narrowband modules (such as CD) cannot be used for large data overhead
  - Narrowband can only provide low data rates.
- Lower sub-GHz band (such as CD)
  - Lower frequency band means less bandwidth available. E.g. cannot use any spread spectrum.
  - Slightly larger antennas on drones needed for lower frequency.
- Interference
  - Users of ISM band do not have control over potential interference.
  - Having to manage and change channels.

# How our low power narrowband can be used in drones

- **Narrowband**
  - Greater sensitivity means increased range.
  - Narrowband means greater selectivity.
  - Good for low data rate, sending single instruction. E.g. emergency stop
- **Sub GHz frequency**
  - For the same antenna gain, lower frequency will have less loss.
  - Optimum full size antennas can be used at the ground station.
  - Better RF penetration in bad weather and around terrain.
- **Reliability**
  - 434 MHz may not be affected by strong WiFi or mobile signals from mobile stations.
  - It can act as a backup direct communication link with no dependence on existing infrastructure.
  - No communication latency.
- **Transparent interface**
  - User can make own protocol in order to maximise communication robustness, minimize latency.

# Example of CD module used for drone

- **STD-601 434 MHz**

- Available data rate: up to 19200 bps
- Between 42 and 800 km range possible
- Can be used with Circuit Design 2 way\* amplifier.
- Compact and light transceiver

\* 2-way means automatically switch to "straight through" mode during RX



Omnidirectional  
Antenna  
~ 2 dBi

Radio  
module  
(10 dBm)

Amplifier  
~ 14 dB



~ 6 dBi

Line of sight  
No obstructions

**Close to  
maximum  
range  
possible**