VCP

Embention

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CONTENTS

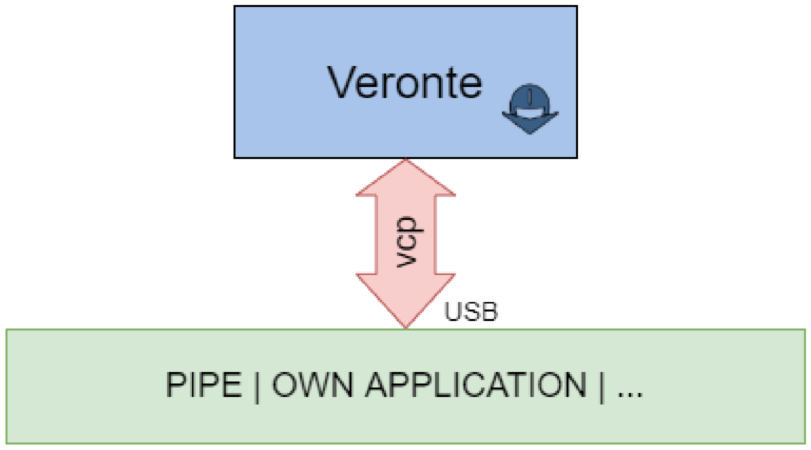
CHAPTER

ONE

1. WHAT IS VCP?

VCP is the abbreviation for **Veronte Communication Protocol**. This Protocol allows the user to "understand" Veronte messages and, in the same way, send messages which Veronte will interpret correctly. In other words, this protocol is essential if we want to talk with any Veronte-based device.

This protocol is used in Veronte Pipe, but it can be used in an own developed application as we can see in the following image:



CHAPTER

TWO

2. REQUIREMENTS

To test the VCP library, Embention team have prepare some easy examples to understand how use it. But, first, we need some requirements:

1. VCP library
2. A device running Windows 10
3. Visual Studio 2015 installed
4. A Veronte-based system
5. An Autopilot Harness

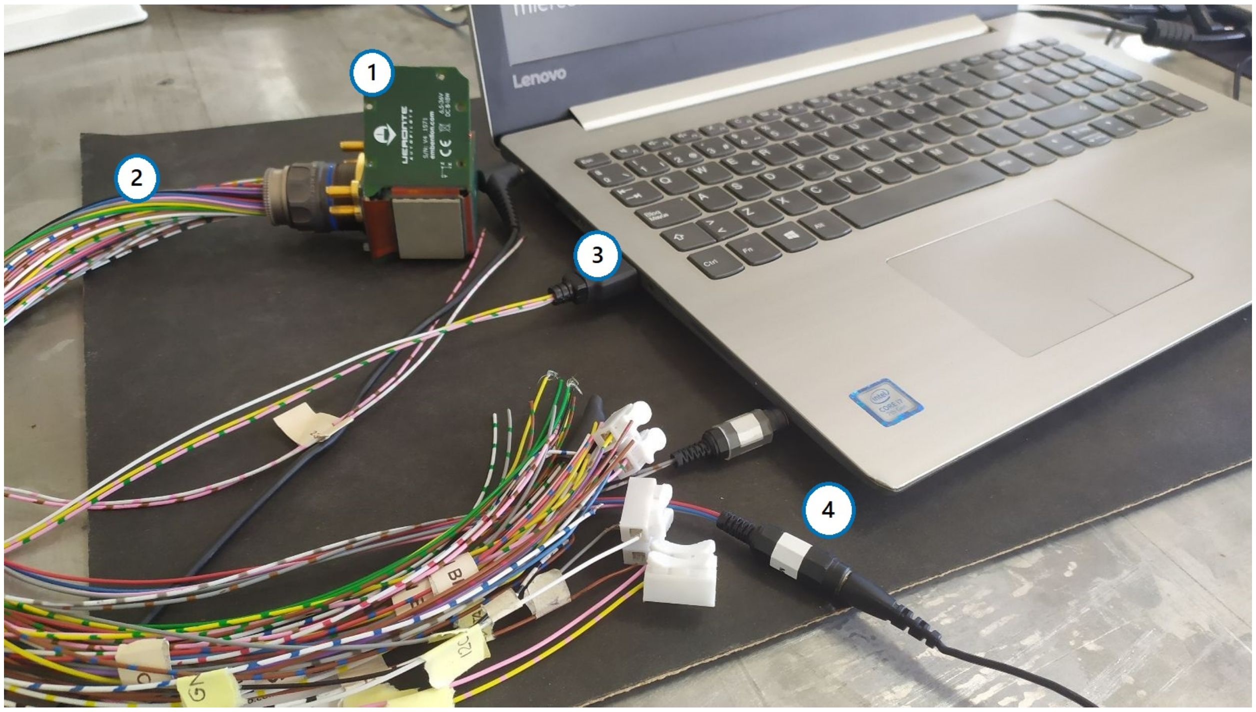
CHAPTER

THREE

3. GETTING STARTED

Firstly, we will connect Veronte to our PC running Windows across the USB port. For electronic specifications, go to Veronte Autopilot.

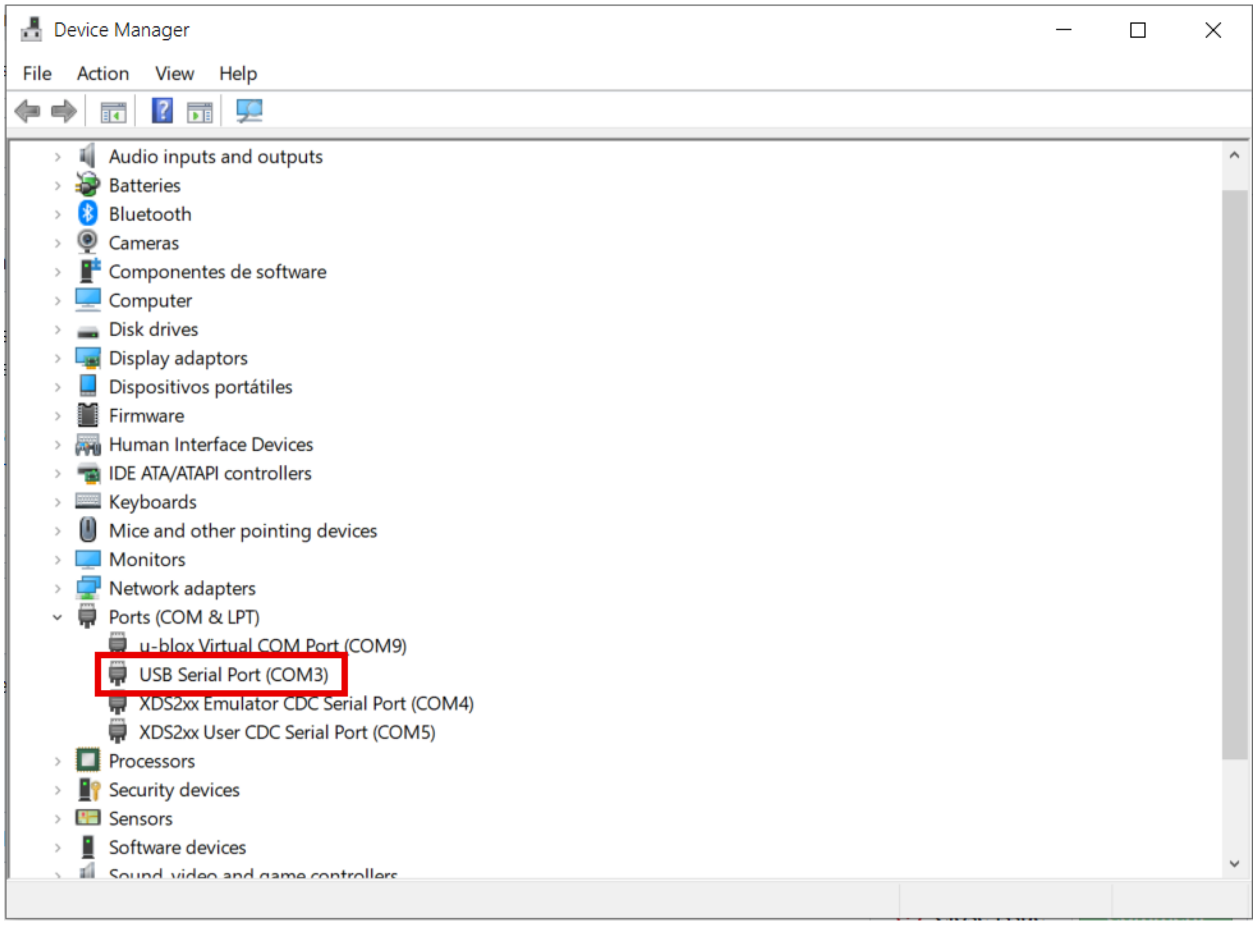
In the following image we can see an example of connection:



Where:

1. Veronte Autopilot
2. Veronte Harness
3. USB connected to PC
4. Vcc

Our PC will assign a COM port to Veronte, which we can check on Device Manager as follow:



```
Audio inputs and outputs
Batteries
Bluetooth
Cameras
Componentes de software
Computer
Disk drives
Display adaptors
Dispositivos portátiles
Firmware
Human Interface Devices
IDE ATA/ATAPI controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
    u-blox Virtual COM Port (COM9)
    USB Serial Port (COM3)
    XDS2xx Emulator CDC Serial Port (COM4)
    XDS2xx User CDC Serial Port (COM5)
Processors
Security devices
Sensors
Software devices
Sound, video and game controllers
```

Make sure veronte is not in maintenance mode

Now, we are ready to launch the examples.

CHAPTER

FOUR

4. VERONTE COMMUNICATION PROTOCOL

Firstly, it is important do a little overview about VCP. For example, which is the shape of VCP messages? The structure of the messages between different elements within a Veronte-based system is as follows:

Field:	0xBA	UAV Org	UAV Dest	Ener Flag	IRX	Arg	Len	CRC	Data	CRC
Bytes:	1	2	2	1-bit	7-bit	1	1	1	0-255	2

The first byte is the header of the message, used to identify an incoming communication as a Veronte message. The following four bytes are the ID addresses, origin and destination respectively.

One of the most important fields for the user is IRX, plus its Argument, where the IRX refers to the command type and the Argument depends on the action to perform. IRX field could be:

- **0x00**: Telemetry messages
- **0x0F**: Stick interface
- **0x22**: Communication Statistics
- **0x29**: Configuration Commands
- **0x2C**: Simulated Navigation
- **0x2E**: Simulated Sensor
- **0x05**: Configuration Files

This message structure is all we need to send and receive information from Veronte.

CHAPTER

FIVE

5. EXAMPLES

5.1 5.1. Common Code

5.1.1 5.1.1. Serial Port

Get the serial COM port used by Veronte and asigned by our PC as *below*, and its initialisation (Specify your assigned COM port as project argument: *Project* -> *Properties* -> *Debugging* -> *Command Arguments*):

```
Serial& serial = Serial::get_instance();         //Serial port instance
const char* port = Serial::get_default_port();   //Get default port
if (argc == 2)                                   //Checks if the user has specified a COM␣
↪port
{
   port = argv[1];                               //Get port as argument
}
serial.init(port);                               //Inits serial port
```

5.1.2 5.1.2. Discovery step

In this step we add the discovery IRX in the command manager to discover the address ID of Veronte connected to our PC.

```
Base::Commgr commgr(myaddr);                     //Command manager instance
Media::Discovery discovery(commgr);              //Discovery instance
commgr.add_irx(Base::discovery_id, discovery);   //IRX addition to Command Manager
```

After this, it is possible to discover our Veronte and its ID:

```
discovery.discover();                               //Discover action
while (!discovery.get_status().received)            //Wait until the veronte has been␣
↪discovered
{
   discovery.discover();
   VCP::send_receive(serial, commgr);               //Updating serial bus
}
Uint16 ver_addr = discovery.get_status().addr.id;   //ver_addr is the Veronte Address ID.
```

This *ver_addr* will be used by many examples as destination address.

5.2 5.2. File Configuration

With the veronte ID, it is possible to change its configuration, for example, in this case we will update the route which the UAV will follow. (This example only shows one point update, go to main_cfg.cpp file to check all code)

Feature references creation:

```
Geo::Ftropf fop;                  //Operation features instance
Base::Feature f0;                 //Feature reference instance
Rv3_64 v0;                        //3D array

v0[0] = -0.01001664582567;        //longitude
v0[1] = 0.66831910249822;         //latitude
v0[2] = 150;                      //height

f0.set_abs(v0);                   //Sets the coordinates of a waypoint from its absolute␣
↪coordinates
fop.opg[0] = f0;                  //Initialize the list of operation generic features

fop.opg.set_enabled(0, true);     //Enables the abstract array
```

Route creation:

```
Base::Patchset_route route;
route.route.set(static_cast<Troute::Pnt_index>(0), Fid::opg_000);
route.route.set_enabled(static_cast<Troute::Pnt_index>(0), true);
route.route.set(static_cast<Troute::Pch_index>(0),
            static_cast<Troute::Pnt_index>(0),
            static_cast<Troute::Pch_index>(-1));
route.route.set_enabled(static_cast<Troute::Pch_index>(0), true);
```

File Configuration IRX and Config Manager IRX instances, and their addition to the Command Manager:

```
Media::Filecom filecom(commgr, myaddr, discovery.get_status().addr, 5.0F);  //File␣
↪Configuration instance
Base::Cfgmgr cfgmgr(commgr, myaddr, discovery.get_status().addr, 5.0F);     //
↪Configuration manager instance

commgr.add_irx(Base::filecom_id, filecom);                                  //IRX␣
↪addition to Command Manager
commgr.add_irx(Base::config_id, cfgmgr);
```

Updating route configuration:

```
//Random identification number of the file transaction
Uint64 uuid_file = rand();
//67 will be interpreted by Veronte as a route change request
if (filecom.send(route, 67, uuid_file)
       && cfgmgr.save(uuid_file, 67))       //File configuration sending and saving␣
↪configuration
{
   bool sending_file = true;
   while (sending_file)
   {
```

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```
      VCP::send_receive(serial, commgr);    //Serial bus refresh

      if (!filecom.step()
                && filecom.is_successful())
      {
         sending_file = cfgmgr.step();      //True when the whole file messages␣
↪transactions have finished
      }
   }
}
```

Feature references manager update:

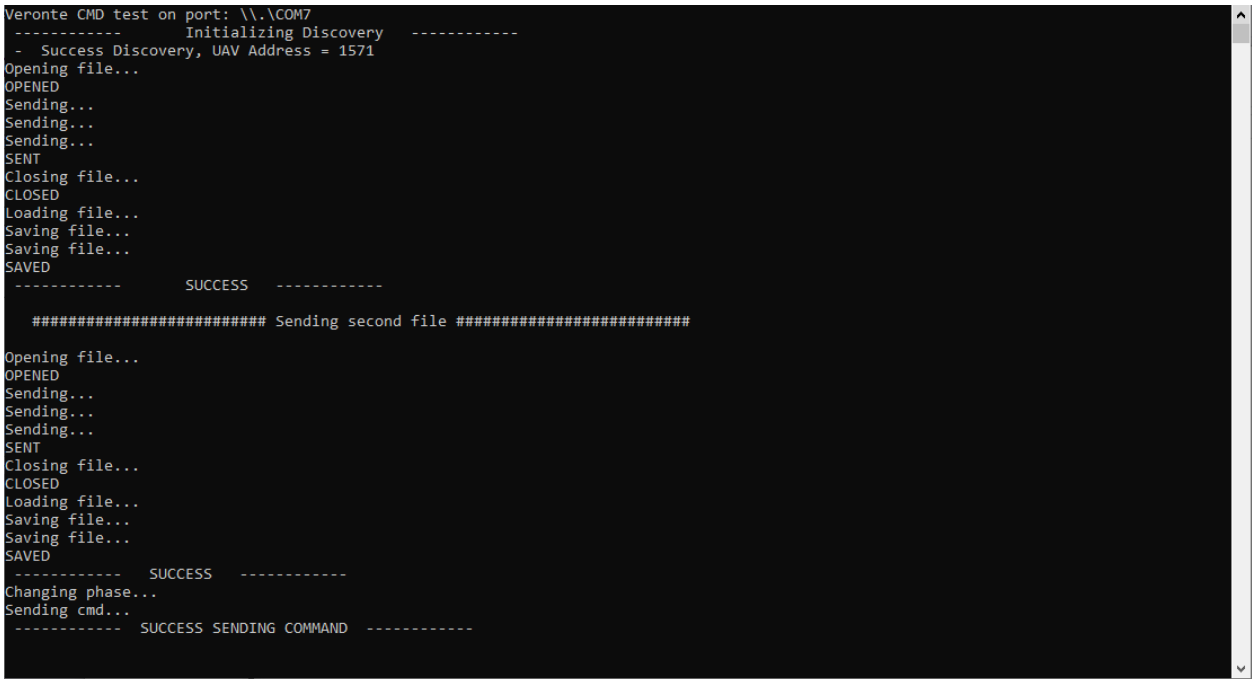
```
//79 will be interpreted by Veronte as a feature references change request
if (filecom.send(fop, 79, uuid_file) && cfgmgr.save(uuid_file, 79))
{
   bool sending_file = true;
   while (sending_file)
   {
      VCP::send_receive(serial, commgr);

      if (!filecom.step() && filecom.is_successful())
      {
          sending_file = cfgmgr.step();
      }
   }
}
```

Finally, we change to phase 0 to test this command using the command manager instanced in Discovery step *code*.

```
build_phasecmd(cfgmgr, 0);                        //Builds change phase command
bool sending_cmd = true;
while (sending_cmd)
{
   VCP::send_receive(serial, commgr);
   sending_cmd = cfgmgr.step();
}
```

5.2.1 5.2.1. Command Prompt

File configuration output:



```
Veronte CMD test on port: \\.\COM7
 ------------       Initializing Discovery   ------------
 -  Success Discovery, UAV Address = 1571
Opening file...
OPENED
Sending...
Sending...
Sending...
SENT
Closing file...
CLOSED
Loading file...
Saving file...
Saving file...
SAVED
 ------------       SUCCESS   ------------

   ########################## Sending second file ##########################

Opening file...
OPENED
Sending...
Sending...
Sending...
SENT
Closing file...
CLOSED
Loading file...
Saving file...
Saving file...
SAVED
 ------------   SUCCESS   ------------
Changing phase...
Sending cmd...
 ------------  SUCCESS SENDING COMMAND  ------------
```

5.3 5.3. Telemetry

Telemetry is sent by default by Veronte, this means it is not necessary create a particular packet to send to Veronte. Of course, it is essential add the IRX to command manager as in filecom *example*, but in this case we will add the telemetry IRX:

```
Base::Commgr commgr(source_address);                     //Command manager instance
Telemetryrx irx1(0, source_address);                     //Telemetry IRX instance
commgr.add_irx(Base::telemetry_id, irx1);                //IRX addition
Uint8 data;                                              //Variable to send/receive
while(true)
{
   if( serial.read(data) )                               //Read from serial port
   {
      commgr.ports.eports.get_port8().write(data);       //Write in port for byte producer/
↪consumer side
   }
}
```

Launching this example we will see in the command prompt:

> *Packet received from UAV XX to UAV XX - Hash: XX - Timestamp: XX*

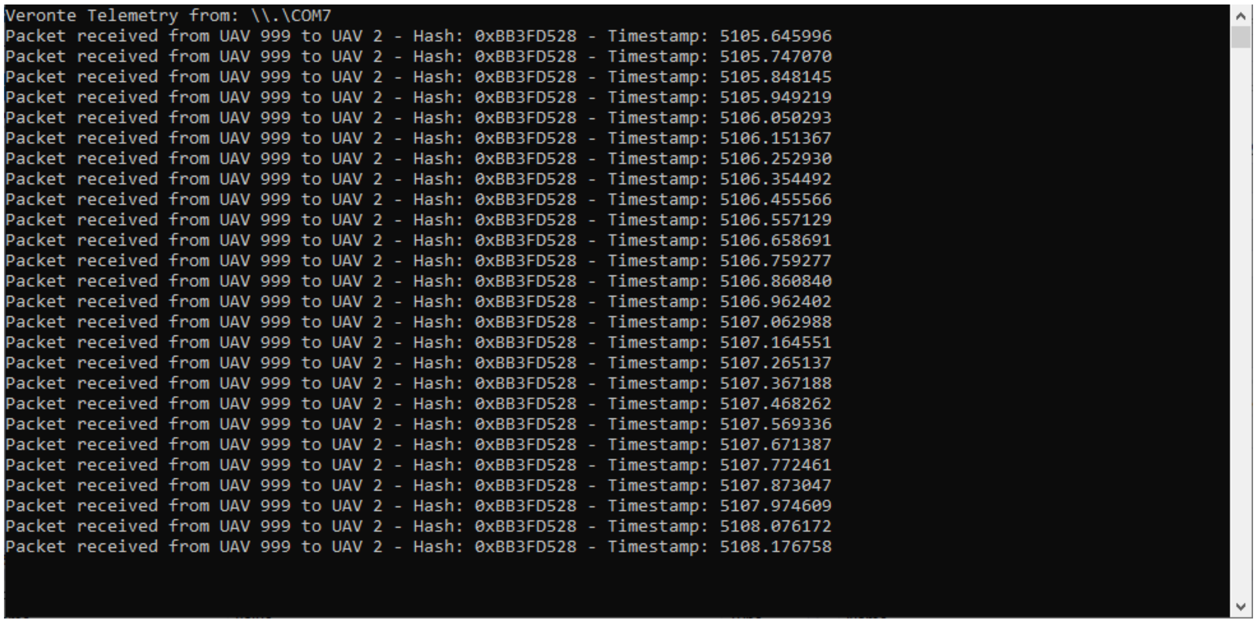
or

> *Packet ignored from UAV XX to UAV XX - Hash: XX - Timestamp: XX*

depending on the correct or incorrect telemetry reception.

5.3.1 5.3.1. Command Prompt

Telemetry output:



```
Veronte Telemetry from: \\.\COM7
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5105.645996
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5105.747070
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5105.848145
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5105.949219
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.050293
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.151367
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.252930
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.354492
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.455566
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.557129
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.658691
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.759277
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.860840
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5106.962402
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.062988
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.164551
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.265137
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.367188
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.468262
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.569336
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.671387
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.772461
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.873047
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5107.974609
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5108.076172
Packet received from UAV 999 to UAV 2 - Hash: 0xBB3FD528 - Timestamp: 5108.176758
```

Version UM.307.5.42.28

Date 2023-01-30