Integration with ROS2

Overview

The Communications node bridges the gap between raw UDP/protobuf packets and the ROS2 ecosystem running on Jonny Boi. This page explains how incoming protobuf messages get converted into ROS2 messages and published on topics, the handler pattern that makes this extensible, and how custom ROS2 message types are defined.

Custom ROS2 Message Types

ROS2 uses its own message format (`.msg` files) to define the structure of data exchanged between nodes over topics. These are separate from protobuf definitions, they exist so that internal ROS2 nodes like the Behavior Node can work with typed, idiomatic ROS2 messages rather than raw protobuf objects.

All custom message definitions live in the `msg/` folder of the `comms` package:

```
comms/msg/
  ImuSensorInformation.msg
  SensorBoardGPSInfo.msg
  SensorBoardPHInfo.msg
  SensorBoardDiagnostics.msg
  SensorState.msg
```

These are registered in `CMakeLists.txt` via `rosidl_generate_interfaces`, which generates the corresponding C++ types at build time. The generated types follow the naming convention `comms::msg::MessageName` and can be included in any C++ file as `#include "comms/msg/message_name.hpp"`. For more on ROS2 interfaces, refer to the official documentation:

https://docs.ros.org/en/humble/Concepts/Basic/About-Interfaces.html

The Handler Pattern

The handler pattern is the core architectural decision that makes adding new message types straightforward without ever touching the dispatch logic in `udp_forwarder_node.cpp`.

Every message type that needs to be converted and published as a ROS2 topic is represented by a handler class. All handlers extend the abstract `Handler` base class defined in `include/comms/udp/handler.hpp`:

```
class Handler {
public:
    virtual ~Handler() = default;
    virtual void handle(const PBEnvelope& envelope) = 0;
};
```

Each concrete handler class — one per message type — lives in `include/comms/udp/handlers/` and its corresponding `.cpp` in `src/handlers/`. Its job is exactly three things:

1. Extract the specific protobuf message from the `PBEnvelope`
2. Map the protobuf fields to the equivalent ROS2 message fields
3. Publish the ROS2 message on the appropriate topic

As an example, `ImuHandler` extracts `SensorBoardIMUInfo` from the envelope, maps its accelerometer, gyroscope and magnetometer fields to a `comms::msg::ImuSensorInformation` message, and publishes it on the `imu_data` topic.

Handler Registration

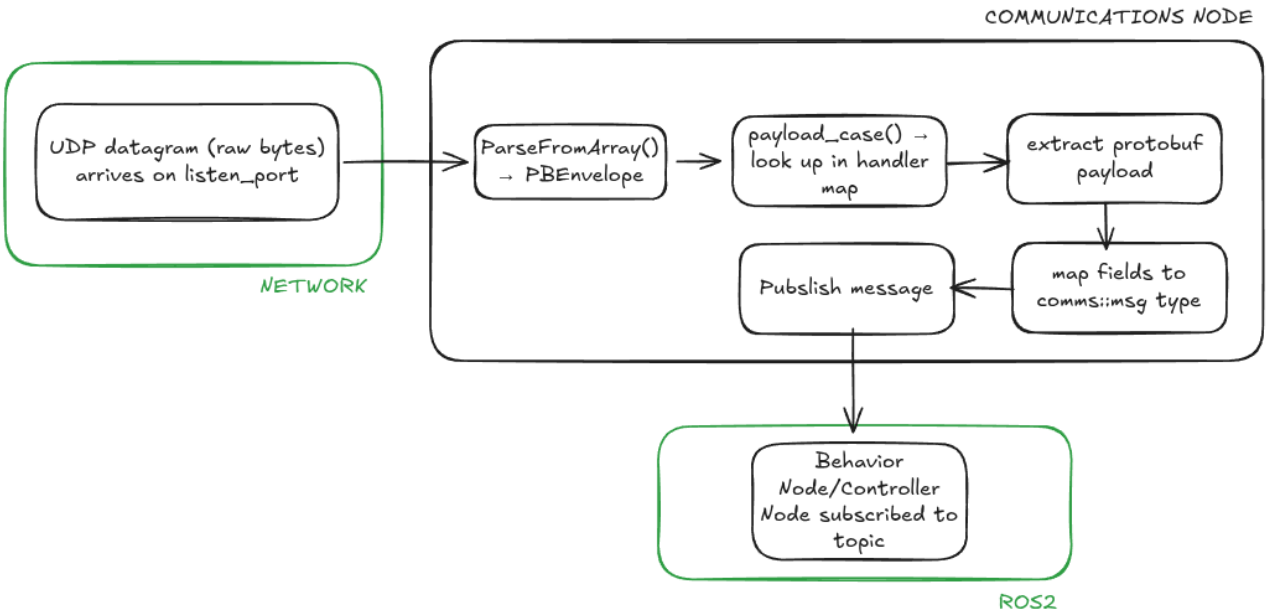
Handlers are registered in the constructor of `udp_forwarder_node.cpp` using a simple `unordered_map` keyed by `PBEnvelope::PayloadCase`:

```
handlers_.emplace(
    static_cast<int>(PBEnvelope::kImuInfo),
    std::make_unique<ImuHandler>(this, "imu_data", 10)
);
```

The three constructor arguments are the node pointer (so the handler can create a ROS2 publisher), the topic name to publish on, and the publisher queue size. To add support for a new message type, you write a new handler class and add one line here. The dispatch logic in `rx_loop` requires no changes at all.

The Full Inbound Flow

The complete path from a raw UDP packet to a ROS2 topic looks like this:



If no handler is registered for a given `payload_case`, the node logs a throttled warning and drops the packet. This means unhandled message types fail silently, keep this in mind when debugging missing data.

The Outbound Flow

The outbound direction works in reverse, the Communications node subscribes to a ROS2 topic, converts the incoming message back into a protobuf, wraps it in a PBEnvelope, and sends it as a UDP packet to the appropriate destination. This path is not yet fully implemented for all message types and will be extended as the Behavior Node develops.

Adding a New Message Type

For a step-by-step guide on adding a new message type end-to-end, from the proto definition all the way to a registered handler — see the dedicated Adding a new message page.

Revision #7
Created 2026-04-16 09:53:23 UTC by Andrei Badea
Updated 2026-04-17 14:20:08 UTC by Andrei Badea