**Project Altair Recruitment Week 2**

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**Github Repository:** [**https://github.com/Rumman023/Project-Altair-Recruitment**](https://github.com/Rumman023/Project-Altair-Recruitment)

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**THEORETICAL PART**

TASK 1:

If I’m in a scenario where a rover is deployed in a remote and vast area, the LoRa module would be a better choice than a generic Radio frequency module. This choice has been taken considering several factors such as range, power consumption, data transmission rate, and the connectivity performance in challenging environments.

Justification: LoRa (Long-Range) is an RF modulation technology specifically engineered for long distance communication. It provides up to 15 KM line of sight distance coverage. Thus this technology makes more useful in the scenario where a rover is deployed in a remote and vast area. Using the LoRa Wan gateway, the 4G internet can be connected to the LoRa, providing a greater area coverage for communication. The generic RF module also has good range of coverage, but not as useful for the scenario. Also the distance varies with extenders like antenna, or the level of frequency or power. In terms of power consumption, a generic RF model receiver supplies 3.5 mA current, with an operating 5V voltage of receiver’s end. But a LoRa RF module draws only 4.2 milliamperes (mA) with an RF output power of +22 dBm, when transmitting or receiving data. So it is very Low Power consuming technology. The LoRa module has a data transmission rate of 50Kbps, which is relatively low than a generic RF module’s data transmission rate, mainly because it is typically used for short-range communication between the connected devices. Also the battery life in a LoRa supported module lasts longer than that of a generic RF module, which is a crucial advantage for a rover deployed in a challenging terrain. LoRa offers a perfect balance between sensitivity and data rate while operating in a fixed-bandwidth channel. RF module equipment requires a special attention to ensure a proper Line-of-Sight (LOS) clearance between the transmitter and receiver. Thus if it encounters any obstacle in-between these 2 nodes, the connectivity can be lost. So it is a a bit fragile architecture in terms of connectivity in challenging terrains. LoRa module, on the other hand, is designed to provide reliable connectivity because of its ability to handle Non-Line-of-Sight communication. So it offers much better performance in obstacle-prone areas, thus making it a better choice for a rover operating in such challenging conditions.

Therefore it can be reasonably concluded that, considering the specific requirements and constraints of the rover’s mission such as range, power consumption, data transmission rate, and the need for connectivity in challenging environments, LoRa module is the better choice for the communication architecture.

References:

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Task 2: