

## Key Notes on LoRa AT Command Guide for RYLR896 Module

### 1. Module Compatibility:

- The guide applies to **RYLR896** LoRa modules, supporting network architectures like Point-to-Point, Point-to-Multipoint, or Multipoint-to-Multipoint.

### 2. Network Configuration:

- **NETWORKID**: Modules must share the same NETWORKID (1–15 recommended) **ZERO is not safe** to communicate. Different NETWORKIDs prevent communication.
- **ADDRESS**: Unique identifier for each module (**0–65535**). Used to specify the transmitter or receiver.

### 3. AT Command Sequence:

- **AT+ADDRESS**: Set module address (stored in EEPROM).
- **AT+NETWORKID**: Set network ID (stored in EEPROM, **avoid 0** as it's the public LoRa ID).
- **AT+BAND**: Set RF frequency (e.g. 915 MHz for RYLR89x, **not stored in EEPROM**).
- **AT+PARAMETER**: Configure RF parameters (Spreading Factor, Bandwidth, Coding Rate, Preamble Length, **not** stored in EEPROM):
  - **Spreading Factor (7–12)**: Higher values improve sensitivity but increase transmission time.
  - **Bandwidth (7.8–500 kHz)**: Lower bandwidth improves sensitivity but extends transmission time.
  - **Coding Rate (1–4)**: 1 is fastest.
  - **Preamble Length (4–7)**: Higher values reduce data loss risk.
  - Recommended settings:
    - **Within 3 km**: **AT+PARAMETER=10,7,1,7**
    - **Beyond 3 km**: **AT+PARAMETER=12,4,1,7**
- **AT+SEND**: Send data to a specific address (max **240** bytes, adds 8 bytes overhead).

### 4. Key AT Commands:

- **AT**: Test module response (**+OK**).
- **AT+RESET**: Software reset (**+RESET**, **+READY**).
- **AT+MODE**: Set mode (0: Transmit/Receive, 1: Sleep, **wakes** on RX pin input).
- **AT+IPR**: Set UART baud rate (300–115200, default 115200, **stored in EEPROM**).
- **AT+CPIN**: Set 32-character AES128 password for network encryption. **Not stored in EEPROM**
- **AT+CRFOP**: Set RF output power (0–22 dBm, stored in EEPROM).
- **AT+VER?**: Query firmware version.
- **AT+UID?**: Query *12-byte* unique ID.
- **AT+FACTORY**: Reset to defaults (e.g., BAND: 915 MHz, UART: 115200, Address: 0).

### 5. Data Transmission:

- **AT+SEND=**

„: Sends data to specified address. Address 0 broadcasts to all (0–65535).

- **+RCV**: Displays received data with Address, Length, Data, RSSI, and SNR (e.g., `+RCV=50,5,HELLO,-99,40`).

## 6. Error Handling:

- Common errors include missing enter (`+ERR=1`), invalid command (`+ERR=4`), or payload exceeding 240 bytes (`+ERR=13`).

## 7. Important Notes:

- Add `\r\n` (enter) to all AT commands.
- Use `?` to query current settings (e.g., `AT+ADDRESS?`).
- Wait for `+OK` before sending the next command.
- Use the LoRa Modem Calculator Tool to estimate transmission time.
- Non-EEPROM settings (BAND, PARAMETER) must be reset after power cycle.

## 8. Manufacturer Contact:

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