

Assignment 7: Logging and Interpreting AT Command Errors

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1. Objective

The goal of this assignment is to explore and document the different types of errors encountered when using AT commands on GSM/LTE modules or emulators. Each error scenario is tested using practical examples, logged, and manually interpreted for educational and troubleshooting purposes.

2. Setup Used

- Emulator: CelerSMS AT Emulator (limited to basic commands)
- Terminal: PuTTY, 9600 baud, COM4
- Operating System: Windows 10
- (Optional) Real modem: Cavli or SIM7600

3. Error Case Studies

3.1. 1. Syntax Error

Command Used:

AT+XYZ

Response:

ERROR

Explanation: The command +XYZ does not exist in the AT command set. This is a typical **syntax error** triggered when an invalid, misspelled, or unsupported command is used.

Resolution: Check the AT command manual of the modem being used. Use **AT+CLAC** (if supported) to list available commands.

3.2. 2. Missing Parameter Error

Command Used:

AT+CSQ=

Response:

ERROR

Explanation: The AT+CSQ command does not require parameters. Adding an equals sign incorrectly implies parameter usage. Many commands only support the read (`'i`) or test (`'=i`) format.

Correct Usage:

AT+CSQ

Resolution: Refer to the correct command syntax in the modem documentation. Avoid using `'=` unless required.

3.3. 3. Invalid Parameter Error

Command Used:

AT+CMGF=5

Response:

ERROR

Explanation: AT+CMGF sets the SMS message format. Valid values are:

- 0 = PDU mode
- 1 = Text mode

Using 5 is invalid and rejected by the modem.

Resolution: Use either AT+CMGF=0 or AT+CMGF=1. Use AT+CMGF=? to check supported values.

3.4. 4. Network/Socket Connection Error

Command Used (on real modem):

AT+QIOPEN=1,0,"TCP",1.1.1.1,65535,0

Response:

+QIOPEN: 0,565

Explanation: The modem attempted to open a socket but failed. The error code 565 indicates:

"Connection timeout or failure — unreachable server or port"

Resolution:

- Ensure SIM is registered on network (AT+CREG?)
- Check PDP context and APN (AT+CGDCONT?)
- Verify server IP/port availability

3.5. 5. SIM Not Ready / Registration Error

Command Used:

AT+CPIN?

Possible Response:

+CPIN: SIM PIN

OK

Explanation: The SIM card is inserted but not yet unlocked with its PIN code. As a result, any network-related command like `AT+CREG?` or `AT+CGACT` will fail.

Resolution:

- Enter the PIN using: `AT+CPIN="1234"`
- Wait for SIM to register and respond with `+CPIN: READY`

4. Conclusion

Understanding and interpreting AT command errors is a key skill in embedded systems and IoT communication. Through this assignment, we've covered a range of common error types, the reasons behind them, and steps for resolving each. This improves both development efficiency and field-level troubleshooting capabilities.

Appendix: Additional Useful Commands

- `AT+CLAC` — List all supported AT commands
- `AT+CREG?` — Check network registration status
- `AT+CGDCONT?` — View current PDP context (APN settings)
- `AT+CPIN?` — Check SIM card state