APPLICATION NOTE – AN107
Radio AT

Introduction

This application note describes the use of the *Radio AT (RAT)* command. This command allows the user to read or write a value stored in a sensor's *XBee* module AT register. This command is helpful for changing *XBee* parameters without disassembling the sensor. The various AT commands are listed in *Appendix B* of the user manual. Be aware that improper use of this command may render the sensor inoperable.

How to use the RAT Command

Commands can be sent to the sensor using any terminal application. IntelliSensing recommends using the *X-CTU* software supplied on our *Software Distribution CD* which ships with our products. The command must be entered into the terminal application in a very specific syntax. This syntax is referred to as a *Command Data Frame Structure*. The *Send Packet* dialogue in Figure 1 illustrates proper syntax. To see the hexadecimal commands in the terminal window click on the *Show HEX* button. Make the *Send Packet* dialogue available by clicking on the *Assemble Packet* button. Select the *HEX* radio button in the *Display* section before entering commands. The hexadecimal value 0x42 is the *API ID* located in byte 9 of the data frame and is the actual *RAT* command to the sensor. As illustrated in Figure 1 the commands entered have been echoed in the terminal window, shown in blue. The information shown in red is the response data followed by the reply data. The two frames can be distinguished by looking for the *Start Delimiter,* indicated by 0x7E in byte 1 of each data frame. The response data frame indicates success or failure of the data transmission to the sensor.

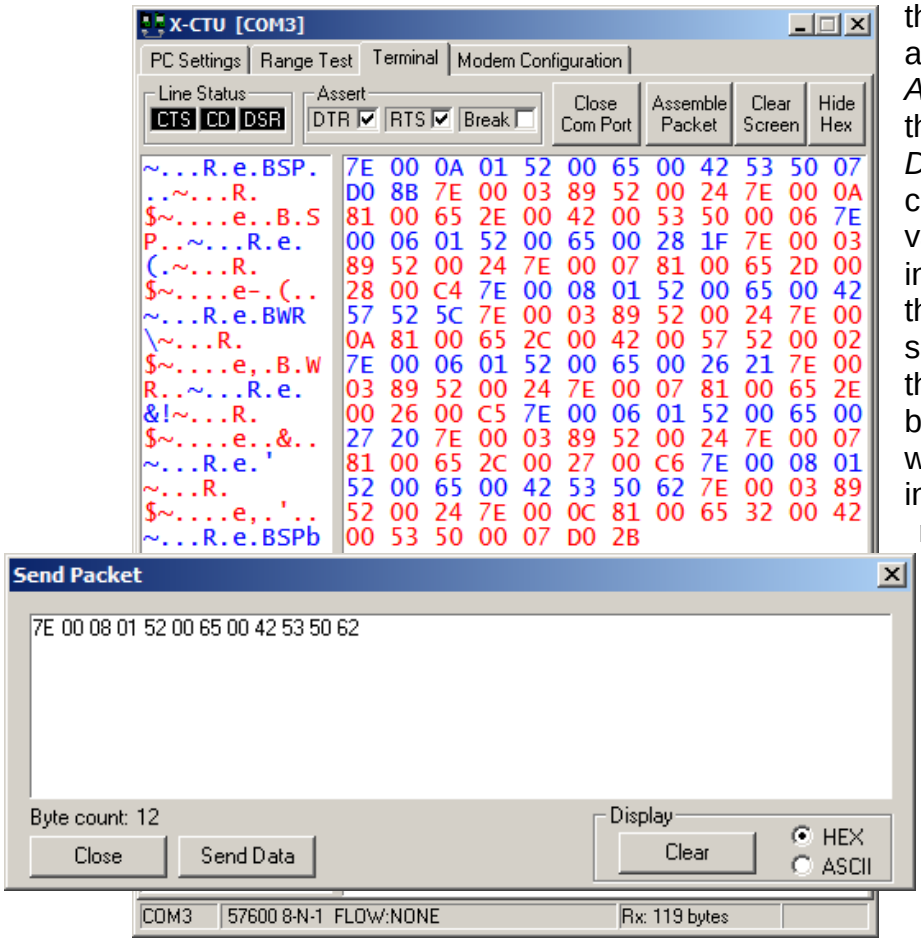

Figure 1: X-CTU Terminal Window

The reply data frame confirms transmission and execution of the command and displays any resulting data. Figure 1 illustrates all of the steps necessary to successfully change the sleep period of the sensor. Changing the sleep period is one of the many different parameters that can be altered via the *Radio AT* commands. There are five packets that need to be entered into the terminal window in order to execute the command; these different commands are displayed in blue in Figure 1. The sixth command in blue is an optional step which simply checks to ensure the data has been stored on the sensor's flash memory.

- Send the desired *RAT* command. Bytes 10 and 11 are the actual AT commands for the parameter being altered. These commands are listed in ASCII format; however, they must be converted to HEX before being entered into the data frame. The ASCII characters are ***case sensitive***.
- Send the *Sensor Factory Unlock (SFU)* command. This enables the overwriting of data into RAM. The data frame structure for this command can be found in the *SFU* section of the user manual.
- Send the *Write (WR)* AT command. This AT command will again be entered into bytes 10 and 11 of the third data frame.
- Send the *Sensor Save Enable (SSE)* command. This enables the saving of data from RAM into the flash memory. The data frame structure for this command can be found in the *SSE* of the user manual.
- Send the *Sensor Memory Save (SMS)* command. This actually saves the data from RAM into the flash memory. The data frame structure for this command can be found in the *SMS* of the user manual.

Conclusion

An exact byte by byte description of the *Command Data Frame Structure* can be found in the *RAT* section of the user manual. The *Radio AT* command can be used to change all parameters of the *XBee* module, not only the sleep period. Other types of commands include: networking, RF and serial interfacing, and diagnostic commands.