Wireless Connectivity

AT14341: WSNMonitor Communication Protocol

APPLICATION NOTE

Introduction

This application note describes the following:

- Message structure that is used to send data to WSNMonitor Java® tool (developed using Java SE 6)
- List of commands available for communicating with WSNMonitor Java tool and to explain command types and format
- Sending and receiving of data between WSNMonitor Java tool and embedded host

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1. WSNDemo

The WSNDemo application implements a typical wireless sensor network scenario. In this scenario, one central node collects the data from a network of sensors and passes this data over a serial connection for further processing. In case of WSNDemo, this processing is performed by the WSNMonitor PC application.

Each node emulates the sensor data reading for light and temperature sensors, and forward the collected data to the WSNMonitor application for visualization. The transmitted values are displayed on WSNMonitor panes as temperature, light, and battery level measurements. WSNMonitor also visualizes network topology by drawing a tree of nodes that have joined the network.

For each node, parameters such as node address, node sensor information, and link quality data are displayed.

2. WSNMonitor Message Format

Common message format that is being sent between WSNMonitor and coordinator is given as:

Table 2-1 Message Format

2 bytes	Variable	2 bytes	1 byte
Start sequence (DLM, STX)	Message	End sequence (DLM, ETX)	Checksum of payload

Constants are defined as:

Table 2-2 Constant Values

Name	Value
STX	0x02
ETX	0x03
DLM	0x10

Note: The value of the constant DLM should be doubled if it appears in message payload.

The `Message` field in payload is as:

Table 2-3 Message Details

Name	Size
Message type	1 byte
Message payload	variable

Message payload size depends on the value of message type.
Note: `Checksum` is the addition of the Start sequence, Message, and End sequence.

3. WSNMonitor Commands

Two main commands are used in WSNDemo as specified in the following table.

Table 3-1 Commands used in WSNDemo

Command	Value
Network Information Command	0x01
Identify Command	0x10

3.1. Network Information Command

The Network Information command is used for sending periodic data. The coordinator periodically transmits its own data and also retransmits data received from router and end device to WSNMonitor GUI.

The message payload format is represented in the following table.

Table 3-2 Payload of Network Information Command

Name	Size [bytes]
Command_ID	1
Node type	1
IEEE® address	8
Node short address	2
Software version	4
WSN channel mask	4
PANID	2
WSN working channel	1
Parent short address	2
LQI	1
RSSI	1
Additional field	variable

The `Command_ID` refers to the constant 0x01. The constants defined for the node type are specified in the following table.

Table 3-3 List of Node types

Node type	Value
Coordinator	0
Router	1
End device	2

The application must fill the other details of the message payload such as channel, Extended address, Short address of node, and PANID.

Packets can always be extended with fields starting with one descriptor byte, followed with byte containing size of additional payload. Additional field formats that are defined are:

Table 3-4 Additional Field Payload

Name	Size [byte]
Additional field type	1
Additional field size	1
Additional field data	Variable

Additional field types can be one of the following formats with the corresponding one descriptor byte value.

Table 3-5 List of Additional Field Types

Name	Value
Board type 1 sensors	1
Packet number	5
Time stamp	6
Active period	7
Node name	0x20

Field data format for Board type 1 is provided in the following table.

Table 3-6 Data Format for Board Type 1 Sensor

Name	Size [bytes)]
Battery status	4
Temperature	4
Light	4

Field data format for Packet Number, Time Stamp, Active Period, and Node Name are provided in the following table.

Table 3-7 Data Format for Packet Number, Time Stamp, Active Period, and Node Name

Name	Size [bytes]
Packet number	2
Time stamp	4
Active period	4
Node name	Size of zero-terminated ASCII coded string

3.2. Identify Command

Identify command is sent from WSNMonitor tool when node light icon is clicked on the GUI. This command is always transmitted from WSNMonitor to coordinator. Coordinator upon receiving this command verifies the destination address to validate the identify command is for itself or any other nodes. It then passes the message to other router or end device if it is not for its own. Default format of the message received is as given in the section WSN messages format. Message payload format is provided in the following table.

Table 3-8 Payload of Identify Command

Name	Length	Value
Command ID	1 byte	0x10
Destination Address	8 bytes	Depends on the node
Duration	2 bytes	0x0BB8
Period	2 bytes	0x0064

`Command ID` corresponds to the Identify command sent from WSNMonitor tool. `Destination Address` corresponds to the node address to which identify command must be send. `Duration` (in milliseconds) denotes the duration the node blinks its LED by identifying itself and `Period` denotes the on/off toggle period.

4. Revision History

Doc. Rev.	Date	Comments
42619A	11/2015	Initial document release

Atmel Corporation 1600 Technology Drive, San Jose, CA 95110 USA **T:** (+1)(408) 441.0311 **F:** (+1)(408) 436.4200 | **www.atmel.com**