Setting Up a DH485 Network of (Bulletin 2750) Intelligent Antennas Using a 2760-RB Module and 2760-SFC2 Protocol Cartridge

Overview

This document provides instructions on interfacing the 2750 Intelligent Antenna (DH-485 Multi-Drop) using the 2760-SFC2 Series A, Revision B protocol cartridge. This information covers the following catalog numbers: Catalog No. 2750-AH, -AHD, -AHP and -AHPR.

These instructions provide supplemental configuration information as described in Publication 2750-ND001. It is meant as a replacement to Chapter 5, Setting Up a DH485 Network (Pages 5-17 to 5-20) and Chapter 7, IDP (Antenna) Commands, (Pages 7-1 to 7-7). Refer to Publication 2750-ND001 for additional setup information as needed.

The Allen-Bradley 2750-AH series Intelligent Antennas transfer information between an RF (Radio Frequency) tag and host(s) on a DH-485 network through the Flexible Interfaces Module (Catalog No. 2760-RB). The antennas operate as slave devices on the network and respond to commands and requests for data from a computer or PLC® on the network. the antennas communicate with RF tags through bi-directional tags.

Hardware Requirements

Implementation of the procedures described in this application note require the following hardware:

- Allen-Bradley Bulletin 2750-AH Series Intelligent Antennas
- Bulletin 2760-RB, Flexible Interface Module
- Bulletin 2760-SFC2, Series A, Revision B, protocol cartridge

Related Publications

This document refers to the following publications, which should be available for reference while working through this application note:

Publication Number	Title
2750-ND001	Bulletin 2750 Intelligent Antenna (DH-485 Multi-Drop) (Catalog No. 2750-AH, -AHD, -AHP, and -AHPR)
2760-ND001	User Manual, Bulletin 2760 Flexible Interface Module (Catalog No. 2760-RB)
2760-ND002	Bulletin 2760 DF1/ASCII Protocol Cartridge User Manual
2760-822	Bulletin 2760 RS-485 LAN Master/Slave Protocol Cartridge

Chapter 5. Setting Up a DH485 Network of Antennas

6a. Set Factory Defaults

This section shows how to set the Flexible Interface Module and device ports to their factory defaults. A default configuration is downloaded to each port.

1. Select menu option *"90B"* to set the device ports to the factory defaults.

```
        2760-RB      SERIES x  REVISION x
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   ---------------------------------------------------

1X - CONFIGURATION PARAMETERS      2X - IDENTIFICATION NUMBERS
3  - DEVICE PORT PROTOCOL NAMES    4DM - MATCH CODE ENTRIES
5I - DISCRETE BYTE INPUT ENTRIES   6  - THE DATA MATRIX ENTRIES
7  - THE PASS THROUGH ENTRIES      8  - NON-VOLATILE SCRATCH PAD AREA
9XF - RB MODULE FUNCTIONS         AX - HARDWARE DIAGNOSTICS
BX - SOFTWARE DIAGNOSTICS          C  - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT    6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT RB CAN PERFORM WHICH ARE DEFINED BELOW :

A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

        ENTER A MAIN MENU SELECTION: 90B [RETURN]
```

You exit the configuration mode and the screen displays:

```
EXIT 2760-RB MODULE CONFIGURATION
```

The device ports are automatically set to their default settings. All of the module LED indicators turn red. Within a short time, the device port LEDs turn green, the configuration port LED turns green, and the ACTIVE/FAULT LED flashes green.

2. Send a *"Break"* to reenter the configuration mode and the main menu.

   Note: The *"Break"* sequence can be sent using key combinations from your terminal or terminal emulator. See your terminal emulator user manual. For ProComm®, the *"Break"* is sent by holding down the [Alt] key and pressing [B].

6b. Verify Factory Defaults

Verify that the factory defaults are set for port 1.

1. Select menu option [3] *"Device Port Protocol Names"* to verify that DH-485 protocol is assigned to port 1.
   Select *"2760-SFC2 DH485"*

```
ENTER A MAIN MENU SELECTION: 3 [RETURN]

PORT 1 = COPYRIGHT 1991, 1990  ALLEN-BRADLEY COMPANY, INC.
2760-SFC2 DH485  , SERIES A , REVISION B  (YES/NO) = YES.

PORT 2 = COPYRIGHT 1991, 1990  ALLEN-BRADLEY COMPANY, INC.
2760-SFC2 DT  , SERIES A , REVISION B  (YES/NO) = YES.

PORT 3 = COPYRIGHT 1991, 1990  ALLEN-BRADLEY COMPANY, INC.
2760-SFC2 DH485  , SERIES A , REVISION B  (YES/NO) = YES.

EDIT THIS SELECTION (YES/NO) ?
```

2. The listing should show DH-485 for port 1. Enter [N] to return to the main menu.

   Note: If another protocol is assigned to port 1, make sure the 2760-SFC2 cartridge is the only cartridge in the module and select menu option 90B to set the device ports to their factory defaults. Select menu option 3 again. The listing should appear as the one above.

   Note: Any of the three network ports on the 2760-RB, ports 1, 2, or 3 can be used to communicate with the intelligent antennas.

3. Select menu option [2] *"Identification Numbers"* to identify the network of devices to operate on port 1. Select *"RS485 LAN OTHER SLAVE DEVICES"*.

```
ENTER A MAIN MENU SELECTION: 2 [RETURN]

CATEGORY 1 ASCII DEVICES (2755-DM6/9)0h, (YES/NO) = YES =? N[RETURN]

EDIT THIS SELECTION?          Y [RETURN]
CATEGORY 1 ASCII DEVICES (2755-DM6/9)1h, (YES/NO) = YES =? N[RETURN]
CATEGORY 1 PCCC DEVICES (2755-DM6/9)1h, (YES/NO) = YES =? N[RETURN]
CATEGORY 1 IDP DEVICES (2750-AH)2h, (YES/NO) = YES =? N[RETURN]
RS485 LAN OTHER SLAVE DEVICES = YES
```

This network requires category 1 slave devices on the link using IDP protocol. The 2750-AH antenna is a slave that uses IDP protocol. The Flexible Interface Module port operates as a master to all antennas on the network.

6c. Activate Polling of Nodes

This section shows how to activate automatic polling of nodes 4 and 5 on the network. All data the module receives from nodes 4 and 5 is sent to the PLC using block transfers.

1. Select option "*11 – Configuration Parameters*" from the main menu. The parameters you need to modify are flagged by arrows.

```
SLOT TIME (NO. CHARS) (DEC 0 ...255) = 7.
INTER-CHAR TIME (NO. CHARS.) (DEC 0 ...255) = 7
IDLE TIME (NO. CHARS) (DEC 0 ...255) = 3.
RETRIES (DEC 0 ...255) 3.
19200 BITS PER SECOND (YES/NO) = YES.
BCD NODE NUMBERS (ENABLE/DISABLE) = ENABLE.
BYTE SWAPPING (ENABLE/DISABLE) = ENABLE.
RECEIVE MATRIXING (ENABLE/DISABLE) = DISABLE.
MATRIX ADDRESS (HEX 0 ...ffff) = 0.
RE-ESTABLISH FREQUENCY (DEC 0 ...255) = 5.
POLL FREQUENCY/DESTINATION [0] (HEX 0 ...ffff) = 5.
POLL FREQUENCY/DESTINATION [1] (HEX 0 ...ffff) = 5.
POLL FREQUENCY/DESTINATION [2] (HEX 0 ...ffff) = 5.
POLL FREQUENCY/DESTINATION [3] (HEX 0 ...ffff) = 5.
POLL FREQUENCY/DESTINATION [4] (HEX 0 ...ffff) = 5. <----
POLL FREQUENCY/DESTINATION [5] (HEX 0 ...ffff) = 5. <----
POLL FREQUENCY/DESTINATION [6] (HEX 0 ...ffff) = 5.
POLL FREQUENCY/DESTINATION [7] (HEX 0 ...ffff) = 5.
POLL FREQUENCY/DESTINATION [9] (HEX 0 ...ffff) = 5.
POLL FREQUENCY/DESTINATION [10] (HEX 0 ...ffff) = 5.

CONTINUE THIS SELECTION (YES/NO) ? N [RETURN]
```

2. Enter N (As shown above) to discontinue the display.

```
EDIT THIS SELECTION (YES/NO)? Y[RETURN]
```

3. Enter Y at the next prompt (As shown above) to edit the selection.

   Questions then display line by line for each node.

4. Enter [RETURN] until the prompt for the node 4 polling frequency is displayed. Then enter 105 and [RETURN] to activate automatic polling for node 4. The value 105 means the module will poll node 4 for data every polling cycle.

```
POLL FREQUENCY/DESTINATION [0] (HEX 0 ...ffff) = 5
POLL FREQUENCY/DESTINATION [1] (HEX 0 ...ffff) = 5
POLL FREQUENCY/DESTINATION [2] (HEX 0 ...ffff) = 5
POLL FREQUENCY/DESTINATION [3] (HEX 0 ...ffff) = 5
POLL FREQUENCY/DESTINATION [4] (HEX 0 ...ffff) = 105
```

5. Enter 105 and [RETURN] to activate automatic polling for node 5.

```
POLL FREQUENCY/DESTINATION [5] (HEX 0 ...ffff) = 105
```

6. Enter "SAVE" and [RETURN] at the next question to save the changes and return to the main menu.

```
POLL FREQUENCY/DESTINATION [6] (HEX 0 ...ffff) = 5 SAVE [RETURN]

PRESS THE RETURN KEY TO CONTINUE.
```

7. Exit Configuration Mode

Now that the module and port 1 are configured, you can exit the configuration mode.

Select menu option "C - Exit Configuration Mode" to exit the main menu and configuration mode.

Chapter 7
IDP (Antenna) Commands Modified for 2760-RB with 2760-SFC2, Series A, Revision B

Chapter Objectives

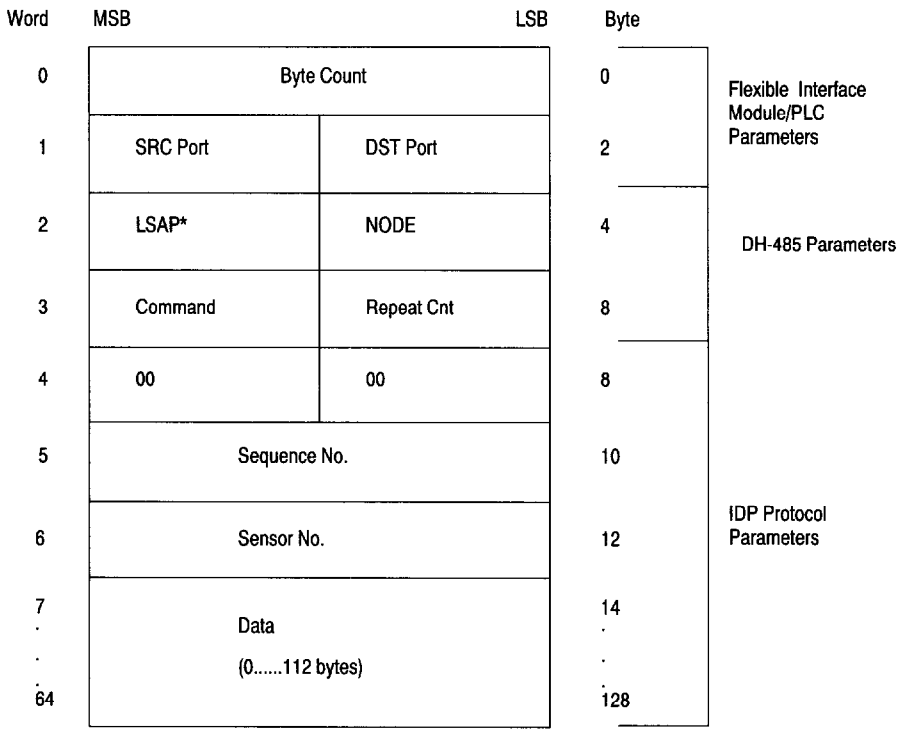
This chapter defines the commands that can be used to operate the antenna when using DH-485 protocol. This chapter includes:

- Description of the general format of commands
- Description of the general format of antenna response
- Example coding, and discussion of command parameters
- Example antenna responses to commands

Command Format

Appendix C provides an overview of the DH-485 protocol. Most of DH-485 network functions are handled automatically by the Flexible Interface Module. The figure below shows the format of commands when communicating with an antenna on a DH-485 network using the Flexible Interface Module.

Figure 7.1
Antenna Command Format (PLC/Flexible Interface Module Host)



Note: The size of the command is limited to 64 words. This is the maximum size of a PLC Block Transfer.

* For RF-DH-485, the LSAP is always 80 HEX.

A host device on the network must provide the following data with each antenna command:

- **Byte Count (PLCs Only)** This Binary Coded Decimal (BCD) indicates the number of bytes in a message' including word 0. Port 5 of the Flexible Interface Module (used for PLC communications) adds the byte count to the message before sending it to another port. The Flexible Interface Module removes the byte count before block transferring the message to the PLC.
- **Source Port # (SRC Port)** The number of the Flexible Interface Module port (0 to 7) sending the message.
- **Destination Port # (DST Port)** The number of the Flexible Interface Module port (0 to 7) receiving the message.
- **Node #** The node (0 to 31) in the network which receives the message.
- **Source LSAP (SRC LSAP)** The communication address of the node sending the message. The 2750-AH antenna uses the LSAP of 128 (80 HEX) to read, write or configure tag data. Use LSAP 00 for network communications diagnostics.
- **Repeat Count** The number of times the command is to be performed.
- **Command (CMD)** The IDP command function to be performed. Set this byte to the appropriate hex code for the desired command. See Table 7.A.
- **Sequence No.** A unique number (supplied by host) that associates an antenna reply with a command. The antenna will return the same value with the reply message.
- **Sensor No.** The high and low bytes are always set to 00.
- **Data** The data field is used with the following commands:

  Echo Command – (Data to be echoed)

  Perform Command – Read and/or write descriptors. Use the Perform command to cause the antenna to perform tag reads and writes, by using that command's data field to code read and write transaction descriptors. See "Perform Command" and also "Sensor Program" descriptions in this Chapter.

  Set/Get configuration commands – Refer to individual commands.

Table 1.A
Command Codes and Descriptions

Command	Code	Command Descriptions
Echo Interface	01	This command sends data to the antenna's host interface processor; data is returned to the host unchanged. Use this command to test the communications link between host and antenna.
Echo Sensor	11	This command sends data to the antenna's sensor processor; data is returned to the host unchanged. Use this command to check the antenna internal RAM swapping.
Interface and Sensor Diagnostics	02	This command causes the antenna to run diagnostics on both the host interface and sensor processor. Returned results are coded in six data bytes.
Sensor Diagnostics	12	This command causes the antenna to run diagnostics on the sensor processor. Results are returned in a two byte data field.
Reset	03	This command causes the antenna host interface and sensor processors to reinitialize and start running again with default configuration. Sensor defaults to settings from the last sensor configuration command.
Get Interface Configuration	04	This command will get the current configuration settings of the host interface. Configuration returned in the data field includes DIP switch settings.
Get Sensor Configuration	06	This command causes antenna to return its working parameters, such as tag type, object detect and time-out. Some parameters (revision number and technology type) are reserved, read only.
Set Sensor Configuration	07	This command sets the antenna working parameters. Read only fields are ignored and should be set to zero.
Perform	08	This command will cause the antenna to execute the sensor program sent to it as many times as is indicated by the repeat count. Sensor program includes tag read and/or write command descriptor(s).

Antenna Response Format

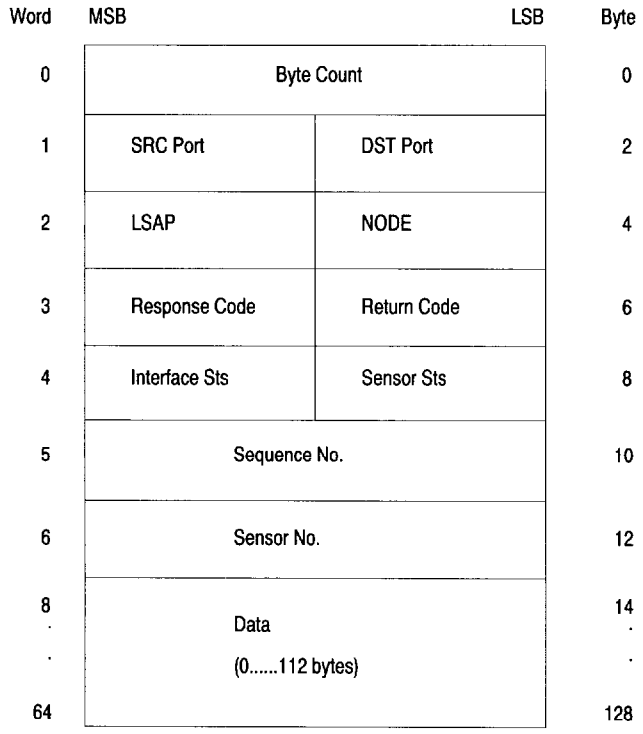
The antenna returns a response to each command from the host (*except* the Reset command). Response information is contained in the first 8 bytes of the antenna's IDP response.

Responses to the following commands return a data field:

- Echo (data returned).
- Perform Read or Write Tag Transactions.
- Get Interface Configuration (configuration returned).
- Get Sensor Configuration (configuration returned).
- Diagnostics.

Refer to the figure below and response field descriptions which follow:

Figure 7.2
Antenna Response Format



Response Code

The response code returns the same command code as the antenna command code, except 80 Hex is added. For example: If the command code is 01, the response code will be 81; if the command code is 12, the response code is 92, etc.

Return Code

This field contains a code indicating the success or failure status of the command execution. The table below lists the return codes.

Table 1.B
Antenna Command Return Codes

Bit Set	Meaning
1	Invalid command
2	Command execution unsuccessful
4	Command format error. see Note 2, below
8	Never returned set
16	Never returned set
5	Never returned set
6	Never returned set
7	Error (set if any other bits are set)
No bits set	Success

Note 1: More than one bit can be set.
Note 2: A command format error is returned for the following:

- "Length" in Sensor Program not equal to actual length of Data field.
- Length of command header and data (if any) not as expected by antenna (header information or data lost).

Host Interface Status

This field contains a code indicating host interface processor status. The table below.

Table 1.C
Host Interface Status

Bit Set	Meaning
0	Internal interface fault
1	Host communications failure
2	Never returned set
3	Never returned set
4	Never returned set
5	Never returned set
6	Never returned set
7	Never returned set
No bits set	Normal status

Note 1: More than one bit can be set.

Sensor Interface Status

This field contains a code indicating the status of the sensor interface processor. The table below lists the status codes.

Table 1.D
Sensor Interface Status

Bit Set	Meaning
0	Internal interface fault
1	Interface to sensor communications failure
2	The data buffer of the sensor has overflowed
3	Never returned set
4	Never returned set
5	Never returned set
6	Never returned set
7	Never returned set
No bits set	Normal status

Note 1: More than one bit can be set.

Sequence Number - Unchanged (Same as in command).

Sensor Number - 00 00 (Same as in command).

Data Field

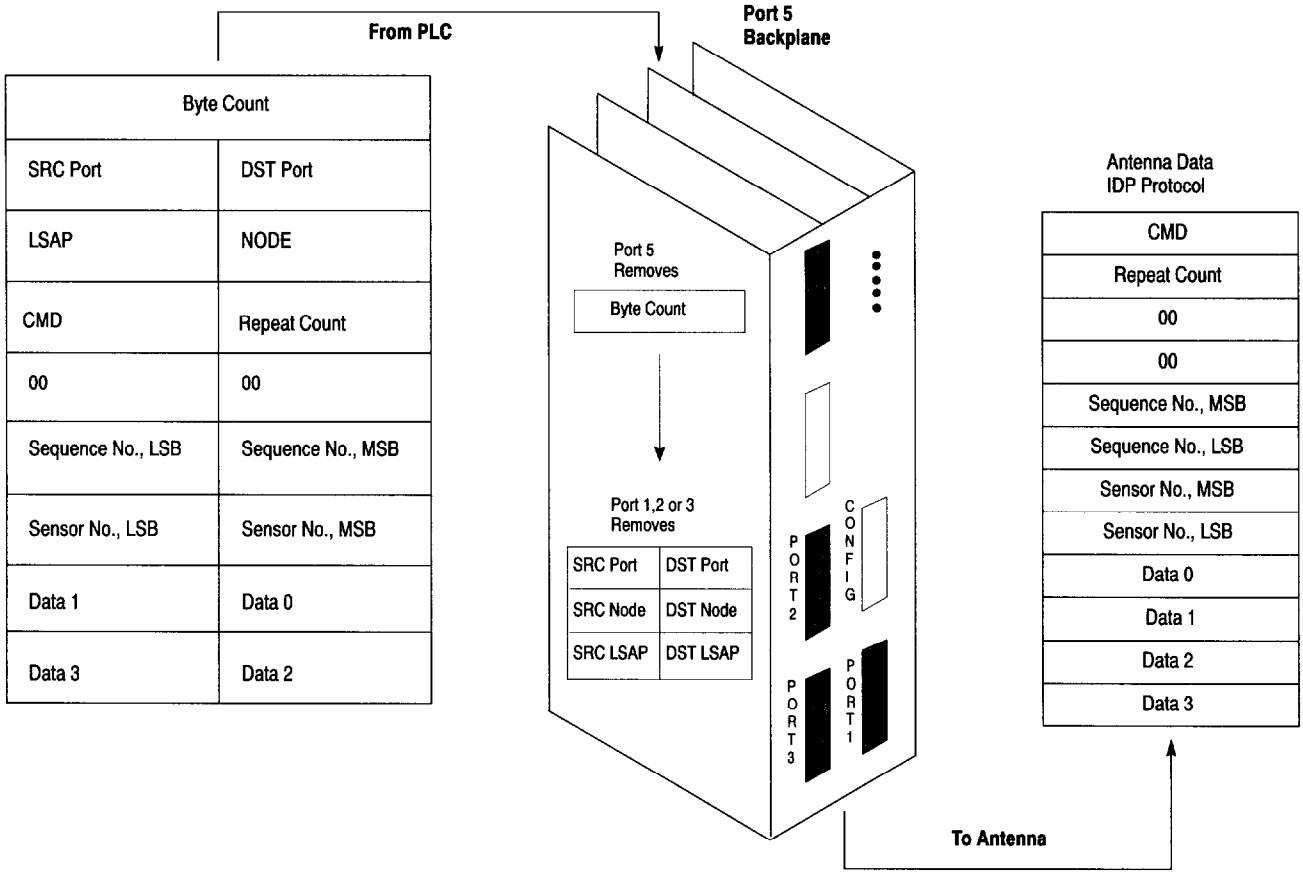
The data field is padded by the Interface Processor so that an even number of bytes are sent in responses. Data is dependent of type of command. See Perform, Echo, and Get Configuration Commands for response data descriptions.

Applying IDP Commands

Figures 7.3 and 7.4 illustrate how the Flexible Interface Module handles data as it is transferred between devices on a DH-485 network:

- Figure 7.3 shows how an IDP command is transferred from a PLC to an antenna on the DH-485 network.
- Figure 7.4 shows how IDP data is transferred from an antenna to a PLC on the DH-485 network.

Figure 7.3
IDP Data from PLC to Antenna



Set Configuration Example Using the 2760-RB and the 2760-SFC2 Cartridge

PLC DATA TABLE	
LSB	**MSB**
00	26
SRC Port	DST Port
LSAP = 80 Hex	Node
07	00
00	00
11	11
00	00
00	00
00	Tag Type *
00	00
00	01
00	FF
00	04

*** Note:** See Publication 2750-ND001, Page 7-17 for information on Tag Type.

Notes:

Notes:

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