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Applications Engineering

RF Sniffer

User's Manual

Rev. 1.1 December 2006

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1.0 Kit Overview



Figure 1-1: RF Sniffer Interface USB Dongle

The ZigBee **RF Sniffer Interface** (RFSI) is a USB Dongle made by Integration. The RFSI is a 2.4GHz RF receiver that connects to a PC's USB port.

The **RF Sniffer software** runs on a PC with Windows O/S. The software allows you to analyze RF communication packets and protocol in a ZigBee network. You can also display a graphical representation of the ZigBee network topology.

	ect Capture	24 (0x18)		MAC)	NWK (APS) (AF) (C	lear) Gra	aphical Topology				Version 1.
No.	1 ime (h:m:s)	Delta (µs)	255	Len	Packet Type Beacon Bermest	SIC PAN	Src MAU Addr	Dest PAN Averee	Dest MA	NWK Scr/Dst	Into
	0:00:01.017300	1.017.300	255	10	Beacon Request			ØxFFFF	ØxFFFF		
	0:00:01.527200	509,900	255	27	Coordinator Realignment	0x1ACE	0x555555555555555	0xFFFF	0xFFFF		
	0:00:46.056000	44,528,800	255	10	Beacon Request			0xFFFF	0xFFFF		
	0:00:46.060000	4,000	255	19	Beacon	0x1ACE	0x0000				Coord (non-bcn PAN, Assoc:1)
	0:00:46.571200	511,200	255	21	Association Request	ØXFFFF	0x0000000000000000	OXTACE	0X0000		IPENDI Response time: 16.50 symbols (
	0:00:47.062900	491,100	255	18	Data Request	0x1ACE	0x0000000000000000	0x1ACE	0x0000		[FEID] Response time 16.56 symbols (-26.56)
	0:00:47.063500	600	252	5	ACK						[PEND] Response time: -10.50 symbols (-22.50)
	0:00:47.066500	3,000	255	27	Association Response	0x1ACE	0x555555555555555	0x1ACE	0x00000		Successful, 0x0001
	0:00:47.067200	700	255	5	ACK						[PEND] Response time: -22.25 symbols (-34.25)
	0:00:47.287800	220,600	255	25	ZigBee Route Request	0x1ACE	0x0001	0x1ACE	0xFFFF	0x0001 >> 0xFFFF	Repair:0 ID:0x02 Dest:0x0000 Cost:0
	0:00:47.291300	3,500	255	5	Zigbee Route Reply	OXTACE	0X0000	OXTACE	0X0001	0X0000 >> 0X0001	Repair:0 ID:0x02 10:0x0001 From:0x0000 Cost:1
	0:00:47 295300	3 400	255	22	HWK Data	0x1ACE	0x0001	0x1ACE	0x0000	0x0001 >> 0x0000	Padius 15 Seg 104
	0:00:47.296000	700	255	5	ACK	VAINOL		VAINOL	0,0000	•***	[PEND] Response time: -12.25 symbols (-24.25)
	0:00:47.299400	3,400	255	25	HWK Data	0x1ACE	0x0000	0x1ACE	0xFFFF	0x0000 >> 0xFFFF	Radius 14, Seq 105
	0:00:47.398000	98,600	255	25	HWK Data	0x1ACE	0x0001	0x1ACE	0xFFFF	0x0000 >> 0xFFFF	Radius 13, Seq 105
	0:01:05.054700	17,656,700	255	10	Beacon Request			0xFFFF	0xFFFF		
	0:01:05.056500	1,800	240	19	Beacon	0x1ACE	0x0001				Router (non-bcn PAII, Assoc:1)
	0:01:05.569900	513,400	255	21	Association Request	ØXFFFF	0X44111111111111111	OXIACE	0X0001		(DEND) Response time: 46-50 symbols (-28-50)
	0:01:05.570500	491 400	255	18	Data Request	0x1ACE	0×44444444444444	0x1ACE	0×0001		[PEND] Response time: -16.50 sympols (-26.50)
	0:01:06.062500	600	255	5	ACK	VAINCE	•******	VALACE	0,0001		[PEND] Response time: -10.50 symbols (-22.50)
	0:01:06.065800	3,300	255	27	Association Response	0x1ACE	0x00000000000000	0x1ACE	0x44444		Successful, 0x0002
	0:01:06.066500	700	252	5	ACK						[PEND] Response time: -22.25 symbols (-34.25)
	0:01:06.286900	220,400	255	25	ZigBee Route Request	0x1ACE	0x0002	0x1ACE	0xFFFF	0x0002 >> 0xFFFF	Repair:0 ID:0x02 Dest:0x0000 Cost:0
	0:01:06.291700	4,800	255	27	ZigBee Route Reply	0x1ACE	0x0000	0x1ACE	0x0002	0x0000 >> 0x0002	Repair:0 ID:0x02 To:0x0002 From:0x0000 Cost:7
	0:01:06.292700	1,000	252	22	ACK	AVIACE	0~0002	AVIACE	0~0000	0-0002 >> 0-0000	[PEND] Response time: -3.50 symbols (-15.50) Deding 45, Sep 404
	0:01:06.295300	2,300	255	5	ACK	UXIACE	0,0002	UNIACE	0,0000	00002 >> 00000	IPENDI Response time: .12.25 symbols (.24.25)
	0:01:06.300900	4,700	255	27	HWK Data	0x1ACE	0x0000	0x1ACE	0xFFFF	0x0000 >> 0xFFFF	Radius 14, Seg 107
	0:01:06.375100	74,200	255	27	HWK Data	0x1ACE	0x0001	0x1ACE	0×FFFF	0x0000 >> 0xFFFF	Radius 13, Seq 107
	0:01:06.397100	22,000	255	27	HWK Data	0x1ACE	0x0002	0x1ACE	0xFFFF	0x0000 >> 0xFFFF	Radius 13, Seq 107
	0:01:06.405500	8,400	255	25	ZigBee Route Request	0x1ACE	0x0001	0x1ACE	0xFFFF	0x0002 >> 0xFFFF	Repair:0 ID:0x02 Dest:0x0000 Cost:1
	0:01:06.409800	4,300	255	27	ZigBee Route Reply	0x1ACE	0x0000	0x1ACE	0x0001	0x0000 >> 0x0002	Repair:0 ID:0x02 To:0x0002 From:0x0000 Cost:2
	0:01:06.410800	1,000	200	27	ZigBee Boute Benky	AVIACE	0×0001	AVIACE	0×0002	0×0000 >> 0×0002	[PEND] Response time: -3.50 symbols (-15.50) Repair: 0 ID:0x02 To:0x0002 Ecom:0x0000 Cost: 3
	0.01.06 413800	700	255	5	ACK	UNIACE	0,0001	UNIACE	0,0002	00000 >> 00002	IPENDI Response time: -22 25 symbols (-34 25)

Figure 1-2: RF Sniffer Software Capture and Topology Windows

2.0 RF Sniffer Interface USB Dongle

NOTE: The following chapters assume that you installed the required ZigBee Demo Kit software and USB drivers while following the QuickStart guide, parts 1 and 2. Please see Appendix A and Appendix B for software and driver installation details, if required.

- 1. Connect the RF Sniffer Interface (RFSI) USB dongle to a free USB port on your PC.
- 2. Start the RF Sniffer software (Start > All Programs > Renesas > RF Sniffer V.x.xx > RF Sniffer).
- 3. Click the **Connect** button on the RF Sniffer Software Toolbar. It changes its color to blue and displays "Disconnect" now instead of "Connect". The channel selector to the right should be set to channel 24 (0x18). The RFSI's red LED will come on when the software connects.

🖪 Renesa	s RF Sniffer					
File Sniffer	Capture Display					
Disconr	Capture	24 (0x18) 💌	MAC NWK APS Z		ear) Graphical Topol	ogy
No.	Time (h:m:s)	Delta (µs)	Packet Type	Src PAN	Src Addr	Dest PAN

Figure 2-1: RF Sniffer Software Toolbar

4. Click the **Capture** button. The RF Sniffer software is now in capture mode.

While in capture mode, the RFSI's red LED will blink whenever a new data packet is received.

3.0 RF Sniffer Software

The RF Sniffer software allows you to protocol and analyze RF communication packets in a ZigBee network. You can also display a graphical representation of the ZigBee network topology. This chapter explains the features of the software.

3.1. Drop Down Menu Items

3.1.1. File Menu

🗷 Renesas RF Sniffer					
File	Sniffer	Capture	Display		
O Sa	pen ave As	Ctrl+O Ctrl+S	24		
E:	kit		n:s)		

Figure 3-1: File Menu

OpenOpen a file with previously captured ZigBee protocol data.Save As...Save the current captured ZigBee protocol data to a file.ExitQuit the RF Sniffer Program.

3.1.2. Sniffer Menu

🗷 Renesas RF Sniffer						
File	Sniffer	Capture	Display			
	Conn Disco	iect innect	ture)			
No	Info		n:m:s)			

Figure 3-2: Sniffer Menu

Connect	Connect to the RF Sniffer hardware.
Disconnect	Disconnect from the RF Sniffer hardware.
Info	Display RF Sniffer hardware Info (firmware revision, type of sniffer board).

3.1.3. Capture Menu

🗷 R	lenesas	RF Sniff	er	
File	Sniffer	Capture	Display	Help
(Connec	Start (Stop C	Capturing Capturing	1
No).	Captur	re Filter	

Figure 3-3: Capture Menu

Start Capturing
Stop Capturing
Capture FilterStart capturing ZigBee network traffic.
Stop the capture process.
The capture filter allows you to filter for specific source and destination
addresses, remove ACK and command packets, and to show packets
with bad CRC.

3.1.4. Display Menu



Figure 3-4: Display Menu

Column Layout	Define the column display order in the capture window and select which items are displayed.
Display Filter	Select which ZigBee packet types to display: ACK, Command, Beacon, Data, Bad CRC packets.
Time Units	Display time information in Microseconds, Milliseconds or Symbol Length.
Delta Time	Define how the Delta Time between two successive ZigBee packets is measured: From the beginning of a packet to the beginning of the next packet, or from the end of previous packet to the beginning of the next packet.
Auto Scroll	With Auto Scroll selected, the capture window will automatically scroll down to always show the latest received RF packet. When auto scroll is deselected the capture window will remain static, new data packets are captured, but you will have to manually scroll down to see them.

3.2. Main Screen Buttons

🖪 Renesas RF Sniffer						
File Sniffer Capture Display						
Disconnect Capture 24 (0)	(18) 💌	MAC NWK APS	ZDO	Clear Gra	aphical Topology)
No. Time (h:m:s) D	elta (µs)	Packet Type	Src	PAN Src Addr		Dest PAN
	Figure 3	-5: RF Sniffer Main	Scree	n Buttons		
Connect/Disconnect	Toggle Clicking Sniffer I Discon Sniffer s	button to connect/o the white Connec nardware. The butto nect . Clicking the b offware from the har	disconr t butto n's col lue Di dware	nect from the on will establis or will change sconnect but	RF Sniffer th a connect to blue and ton will disco	hardware. tion to the its text to onnect the
Capture	Toggle I Clicking button's Stop bu	button to start/stop the the white Capture color will change to tton will end the capt	he Zigl buttor blue a turing p	Bee network tr will start the and its text to process.	affic capturin capture pro Stop . Clickir	g process. cess. The g the blue
RF channel	Drop-do channel The defa	wn selection menu number is displaye ault channel used by	to so d in bo the ZE	elect the Zigl oth decimal ar)K boards is ch	Bee RF chand hexadecin nannel 24 (0x	annel. The nal values. (18).
Protocol Layer	Four se determin The cur show th (IEEE 8 the ZigE ZDO for does no	lection buttons, label ne the type of ZigBee rent selected layer's le raw data transmi 02.15.4 RF layer sp Bee network layer. A ZigBee Device Obje t vet support displavi	e proto buttor itted a ecificat NPS state ct laye	C, NWK, APS col layer show n is colored bl t the Medium tion). Selecting ands for ZigBe er. The current a at the APS a	and ZDO a n in the captu ue. Selecting Access Cor NWK displate e application version of the nd ZDO lave	Ilow you to Jre window. MAC will htrol Layer ays data at layer and le software r levels.
Clear	Pressing window.	g the Clear button of	clears t	the content of	the RF Snif	fer capture
Graphical Topology	Opens network graphica connect been sta any Zig network	a new window with s topology. <i>Note:</i> F al topology of the r ed to the Sniffer ha arted before the Zigl Bee device is being	a gra for the networl ardware Bee ne g switc	aphical represe software to k, the RF Sn e and the Cap twork is being hed on and ju	entation of t be able to o iffer software oture mode established, pins or estab	he ZigBee display the e must be must have i.e. before plishes the

3.3. Capture Windows

3.3.1. Column Layout Window

Di	sconnect Capti	ure) 24 (Ox	18) 🔽 (MAC) (NWK	APSZ	DD Clear Gra	ohical Topolo	gy)			<mark>י</mark> ג	ENE:	5AS
No.	Time (h:m:s)	Delta (µs)	Packet Type	Src PAN	Src Addr	Dest PAN	Dest Addr	Info	Len	Seq.	LQI	CRC
0	0:00:00.000000	0	Beacon Request			0xFFFF	0xFFFF		10	0xD0	116	ок
1	0:00:01.018346	1,000,346	Beacon Request			0xFFFF	0xFFFF		10	0xD1	128	OK
2	0:00:09.254758	8,000,412	Beacon Request			0xFFFF	0xFFFF		10	0xD0	64	OK
3	0:00:09.257964	3,206	Beacon	0x1ACE	0x0000			From Coord (non-bcn PAN, Batt:1 Assoc:1)	19	0x59	96	OK
4	0:00:09.773690	515,726	Beacon Request			0xFFFF	0xFFFF		10	0xD1	60	OK
5	0:00:09.776241	2,551	Beacon	0x1ACE	0x0000			From Coord (non-bcn PAN, Batt:1 Assoc:1)	19	0x5A	124	ок
6	0:00:10.290957	514,716	Association Request	0xFFFF	0x4444444444444444	0x1ACE	0×0000	FFD, 16-bit, RxIdle,	21	0xD2	68	ок
7	0:00:10.292017	1,060	ACK					Response time: 12.25 symbols (+0.25)	5	0xD2	148	ок
8	0:00:10.785648	493,631	Data Request	0x1ACE	0x4444444444444444	0x1ACE	0×0000		18	0xD3	68	ок
9	0:00:10.786613	965	ACK					Response time: 12.31 symbols (+0.31)	5	0xD3	152	OK
10	0:00:10.788923	2,310	Association Response	0x1ACE	0x555555555555555555555555555555555555	0x1ACE	0x4444444444444444	Successful, 0x0001	27	0xD3	152	ок
11	0:00:10.790175	1,252	ACK					Response time: 12.25 symbols (+0.25)	5	0xD3	68	OK
12	0:00:11.009154	218,979	ZigBee Data	0x1ACE	0x0001	0x1ACE	0×0000	0x0001 >> 0x0000 (R:15 S:158)	22	0xD4	64	ок
13	0:00:11.010246	1,092	ACK					Response time: 12.25 symbols (+0.25)	5	0xD4	152	ок
14	0:00:11.019741	9,495	ZigBee Data	0x1ACE	0x0000	0x1ACE	0xFFFF	0x0000 >> 0xFFFF (R:15 S:158)	52	0xD4	152	OK
15	0:00:11.031410	11,669	ZigBee Data	0x1ACE	0x0001	0x1ACE	0xFFFF	0x0000 >> 0xFFFF (R:14 S:158)	52	0xD5	68	OK
16	0:00:15.453561	4,000,151	ZigBee Data	0x1ACE	0x0000	0x1ACE	0xFFFF	0x0000 >> 0xFFFF (R:15 S:159)	26	0xD5	120	OK
17	0:00:15.481681	28,120	ZigBee Data	0x1ACE	0x0001	0x1ACE	0xFFFF	0x0000 >> 0xFFFF (R:14 S:159)	26	0xD6	60	OK
18	0:00:15.665915	184,234	ZigBee Data	0x1ACE	0x0000	0x1ACE	0xFFFF	0x0000 >> 0xFFFF (R:15 S:160)	26	0xD6	120	OK
19	0:00:15.692002	26,087	ZigBee Data	0x1ACE	0x0001	0x1ACE	0xFFFF	0x0000 >> 0xFFFF (R:14 S:160)	26	0xD7	60	OK
20	0:00:19.637635	3,000,633	ZigBee Data	0x1ACE	0x0000	0x1ACE	0xFFFF	0x0000 >> 0xFFFF (R:15 S:161)	26	0xD7	116	OK
24	0-00-10 6/123/10	4 744	7icRee Data	0v1ACE	0v0001	Av1ACE	A-FEFF	0v0000 >> 0vFFFF (D+14 S+164)	36	0~08	6.4	OK

Figure 3-6:	RF Sniffer	Column La	yout Window
-------------	-------------------	-----------	-------------

The Column Layout Window displays several columns of information about every ZigBee packet received. The order of the columns and the items displayed can be changed via the Display > Column Layout menu. The column headings in the screenshot shown in Figure 3-6 from left to right are:

No. The packet number.

Time	The time in absolute Microseconds from the time the very first packet was received.
Delta	The delta time in Microseconds between the start of two packets.
Packet Type	The ZigBee packet type.
Src PAN	The Source PAN (Personal Area Network) address of the transmitting ZigBee node.
Src Addr.	Source Address. The address of the transmitting ZigBee node.
Dest. PAN	The Destination PAN address, i.e. the PAN to which the receiving node belongs.
Dest. Addr.	Destination Address. The address of the receiving ZigBee node.
Info	Information about the packet. The display in this column depends on the selected protocol layer (MAC, NWK, APS or ZDO) and the type of packet transmitted.
Len	The Length of the ZigBee packet in bytes.
Seq.	The Sequence number of the MAC header packet.
LQİ	Link Quality Indication. LQI is a calculated value between 0 and 255 with a higher
	LQI number indicating a better link quality.
CRC	Cyclic Redundancy Check. ZigBee packets are transmitted with a CRC checksum for error recognition and correction. If " OK ", the packet was received without transmission errors.

3.3.2. Display Filter Window

113 114 115 116 117	0:08:15.388617 0:08:15.583595 0:08:15.587658 0:08:16.960073 0:08:16.987028	28,976 194,978 4,063 1,000,415 26,955	ZigBee Data ZigBee Data ZigBee Data ZigBee Data ZigBee Data ZigBee Data	0x1AC 0x1AC 0x1AC 0x1AC 0x1AC	:E :E :E :E	0x00 0x00 0x00 0x00 0x00 0x00	01 00 01 00 01				0x1A 0x1A 0x1A 0x1A 0x1A 0x1A	ACE ACE ACE ACE ACE	0x 0x 0x 0x	FFFF FFFF FFFF FFFF				000000000000000000000000000000000000000	x000 x000 x000 x000 x000	0 >> (0 >> (0 >> (0 >> (0 >> (0 >> ()xFFF)xFFF)xFFF)xFFF)xFFF	F (R:14 F (R:15 F (R:14 F (R:15 F (R:14	S:191) S:192) S:192) S:194) S:194) S:194)	>	111 •
	Packet (Length: 2 Length : 26 Link Quality II Frame Check MAC Header NW/K Header (Da Dest Addr: 0x Dest Addr: 0x Source Addr: Radius: 14 (N Sequence NU NW/K Payload Da 100 00 00 00 01	26, LQI:40, F ndication : 40 Sequence : CF ata Packet) I FFFF 0x0000 x0E) amber: 191 (0xB ata (7 bytes) TF AA 8C	SC: ОК АС ОК IF)	0000	41 BF	88 00	F6 00	CE 00	1A 01	FF FF	FF AA	01 8C	00	04	00	FF	FF	00	00	OE	Α.				•
	•			<										1111											>

Figure 3-7: RF Sniffer Display Filter Window

Figure 3-7 shows the details of the ZigBee packet # 133 that was selected by clicking on the corresponding row in the column layout window above. The left windowpane shows the different components of the ZigBee packet: Packet Length, MAC Header, NWK Header and NWK Payload. The right windowpane shows the raw data bytes of the packet as both 8-bit hex values and ASCII code. Clicking on an entry in the left windowpane will highlight the corresponding hex values in the right pane in blue. In above example the 7-byte NWK payload is 00 00 00 01 FF AA 8C. Byte 1 = 00 indicates that a ZDK board transmits a new LED and sensor state. The next three bytes represent the status of the red, yellow and green LEDs respectively (00 = LED off; 01 = LED on). The next three bytes are the 8-bit analog values of the board's potentiometer, light and temperature sensors, respectively.

3.4. Graphical Topology Window

Click on the **Graphical Topology** button and a window will open showing you the ZigBee nodes that are members of the network, how they are interconnected, and the flow of information between them. In the example screen shot below, the node with address 0000 (the coordinator) sends a packet to the node with address 0001.





Topology Window Buttons:

Clear	Clear the	Topology	Window	Displa	v

- **Use CSkip** This is a toggle On-Off button. The term CSkip refers to the Child-Skip algorithm outlined in the ZigBee specification. When this button is left "On", the topology of the network will be determined by the source addresses of each captured packet using the CSkip algorithm and the values of Cm-Rm-Lm button.
- Cm#,Rm#,Lm# This button is used to show and set the current network configuration parameters for the ZigBee CSkip algorithm. These values **must** match your current network configuration to produce an accurate topology representation.

Appendix A. Software Installation

Before using the RF Sniffer Kit, you need to install the required software files and applications. Do **not** plug the RF Sniffer Interface (RFSI) into your PC until the installation process is finished. The installer will automatically detect prior installations of the software and prompt you to remove those before continuing.

Please insert the enclosed CD into your computer's CD-ROM drive. The CD should auto-start, displaying the ZigBee ZDK Install Screen. Select "ZigBee ZDK For M16C". Follow the directions in the installation windows to install the ZDK demo software tools and the RF Sniffer software.

If the installation screen does not appear, please browse to the CD root folder and double-click on ZDK Installer.exe.

Please review the QuickStart Guide, which may contain information about the RF Sniffer that was not yet available when this user manual was printed.

If you experience problems with the install software, please see chapter "C.1 Manual Installation" in Appendix C.

Appendix B. Driver Installation

Your ZigBee Development Kit includes a ZigBee RF Sniffer Interface (RFSI) USB stick. When you connect the RFSI to your computer for the first time, Windows will recognize the new device and request the driver. Follow the steps below to install the driver for the RFSI. Administrator privileges are required to install the driver on a Windows 2000/XP machine.

- a.) Plug the RFSI USB stick into a free USB port on your PC. The Windows New Hardware Wizard should start.
- b.) In the New Hardware Wizard Welcome screen, select "No, not this time" when the Wizard prompts to search Windows Update for software and click on **<Next>**.
- c.) Select "Install from a list or specific location (Advanced) and click on <Next>.
- d.) Select "Search for the best driver in these locations" and place a check mark in front of "Include this location in the search".
 Browse to C:\Renesas\RFSniffer\USB Driver\Integration Dongle and click on

e.) Click <Finish>.

Found New Hardware Wizard					
Please choose your search and installation options.					
● Search for the best driver in these locations.					
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.					
Search removable media (floppy, CD-ROM)					
✓ Include this location in the search:					
C:\Renesas\RFSniffer\USB Driver\Integration Dongl 🔽 🛛 🛛 🛛 🛛 🛛 🖉					
◯ Don't search. I will choose the driver to install.					
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.					
< <u>B</u> ack <u>N</u> ext > Cancel					

Figure 12: New Hardware Wizard Search Path

<Next>.

Appendix C. Troubleshooting Guide

This section discusses possible problems you may encounter while installing the RF Sniffer software and drivers. This section also discusses the countermeasures and solutions to resolve these problems.

For troubleshooting information on the Flash-Over-USB programming software, In-Circuit Debugger and Renesas HEW, see the ZDK Kit User's Manual.

If, for any reason, you cannot resolve the problem, please contact your Renesas representative for assistance.

C.1 Manual Installation

Before connecting the RF Sniffer Interface to your PC, the driver files (.inf and .sys) and executables must be copied to the C:\Renesas\RFSniffer\USB Driver\Integration Dongle directory.

To do this, double-click RFSniffer_V.xx.exe under \Tools\RFSniffer directory on the CD. After the RF Sniffer install, assuming the default directory was used, a C:\Renesas\RFSniffer subfolder should have been created. The Windows USB drivers for the RF Sniffer Interface are located in the C:\Renesas\RFSniffer\USB Driver\Integration Dongle directory. The driver files are: IAIDAUB1.sys and IAIDAUB1.inf.

NOTE: If you are using Windows 2000 or XP, you will need Administrator privileges to be able to install the drivers.

- (1) Windows 2000
 - (a). Install RF Sniffer software by double-clicking on RFSniffer_V.xx.exe from the \Tools\RFSniffer folder of the CD.
 - (b). Copy the IAIDAUB1.inf file from C:\Renesas\RFSniffer\USB Driver\Integration Dongle folder to \WINNT\INF folder.
 - (c). Copy the IAIDAUB1.sys file from C:\Renesas\RFSniffer\USB Driver\Integration Dongle folder to \WINNT\SYSTEM32\drivers folder.
- (2) Windows 98
 - (a). Install RF Sniffer software by double-clicking on RFSniffer_V.xx.exe from the \Tools\RFSniffer folder of the CD.
 - (b). Copy the IAIDAUB1.inf file from C:\Renesas\RFSniffer\USB Driver\Integration Dongle folder to \WINDOWS\INF folder.
 - (c). Copy the IAIDAUB1.sys file from C:\Renesas\RFSniffer\USB Driver\Integration Dongle folder to \WINDOWS\SYSTEM32\drivers folder.

C.2 Driver Problems

This part discusses how to fix common problems that may occur with USB driver installation. The most common problem is that Windows did not properly install the USB drivers and so the RFSI is not recognized. When checking the device status in the Windows Device Manager (Start > Control Panel > System > Hardware > Device Manager > Universal Serial Bus controllers > IAI-DAUBI-2400 V033), it will indicate that the device is not working properly. A further indication of

this problem is that the Sniffer software is unable to connect to the USB dongle (dongle's red LED does not come on).

Before trying the following steps, try re-starting your PC to see if this resolves the problem. You can check the status using the Device Manager. If the Renesas RF Sniffer appears under the Universal Serial Bus Controllers with **no** red X or yellow exclamation point, the driver was installed properly.

For cases where the "Device Status" states the device is not working properly, please try the following:

- 1. Double-click on IAI-DAUBI-2400 V033. A Properties dialog box appears.
- 2. Click on **Driver** tab and click on **Update Driver** button.
- 3. Select "Display a list..." and click on **Have Disk** button.
- 4. Locate the C:\Renesas\RFSniffer\USB Driver\Integration Dongle directory and install the IAIDAUB1.sys driver.
- 5. If this process does not work, please follow the instructions below.

For cases in which the driver was not installed properly by Windows (Windows 98, Windows 2000) or is not listed in the Device Manager > Universal Serial Bus controllers, please try the following:

- 1. Unplug the USB Cable so Windows removes the driver from memory.
- 2. Delete the driver IAIDAUB1.sys from \WINNT\SYSTEM32\DRIVERS\ folder in Windows 2000 or \WINDOWS\SYSTEM32\DRIVERS folder in Windows 98.
- 3. Plug in the RFSI and try installing the driver as described above, using the driver from the C:\Renesas\RFSniffer\USB Driver\Integration Dongle directory.

Appendix D. Reference Manuals

ltem	Title	Description
1.	Renesas ZigBee Demonstration Kit (ZDK)Quick Start Guide	Document that will help you get started on using the ZigBee demonstration Kit.
2.	RF Sniffer User's Manual	This document.
3.	ZDK Board Schematic	Schematic diagram for the RF Sniffer and ZDK boards.
4.	ZDK Board BOM	Bill of materials for the ZDK board.
5.	M16C/20/60 Series C-Language	ANSI C-language programming guide for the
	Programming Manual	M16C/20/60 series MCU.
6.	M16C/20/60 Series Assembler	Assembly language programming guide for the
	Language Programming Manual	M16C/20/60 series MCUs.
7.	HEW User's Manual	This document describes installation and operation
		of the Integrated Development Environment for
		Renesas' Tools.
8.	AS30 User's Manual	Guide for AS30 assembler.
9.	NC30 User's Manual	Guide for NC30WA C-compiler.
10.	RTA-FoUSB-MON User's Manual	In-Circuit Debugger and Programmer User's Manual

NOTE:

The installer will copy all these manuals during installation. They can be accessed using the Document Descriptions file by clicking on Start > Programs > Renesas > RZB_CC16C_ZDK > All Manuals and Documents