Silica JenNode - JN5168 demobaord Documentation

Release 0

Silica

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CHAPTER 1

INTRODUCTION

Silica Rialto Board is useful system to evaluate a basic IEE802.15.4 network using JN5168 wireless module. Rialto board has a single built-in USB dongle. Simply switching serial channel from terminal application to programming software, you can perform two alternate functions:

a - Evaluate network with simple serial monitor (using a PC terminal such as HyperTerminal)

b - Program Firmware into JN5168 module (using JN-SW-4007-Flash-Programmer v1.8.9)

If you want, you can use separate USB-TTL adapter connected with 6 pin strip on Rialto board. In this case, you can have two separate serial channel, first (USBdongle) for programming and second (6 pin strip) for Serial Monitor. See Serial channel details

Rialto board is also designed as a plugin for SerizII board. **Rialto "ready to run" kit** is specially designed for quick use and fast evaluate network functionallity. All you have to do is plug End-Node on SerizII board, plug Coordinator on PC USB port, start HyperTerminal and enjoy!!

With Rialto board you can evaluate the performance of new NXP SENS300/01 device. The SEN300/01 integrates one high-accuracy temperature sensor, four relative humidity sensors, six light sensors, a user-writable non-volatile memory and a 10-bit analog-to-digital converter. Rialto application reads out basic data from temperature, humidity and light sensors. For more information about this sensor, see at NXP official site NXP official site

Rialto board integrates a NTAG203F, NFC Forum Type 2 Tag compliant IC with 144 bytes user memory and field detection. This device is used on SerizII labs. See at official documentation page of NXP site NTAG203F

Firmware application was developed with JN-SW-4041-SDK-Toolchain-v.1.1 (Eclipse based).

You must also install JN-SW-4065-JN516x-JenNet-IP-SDK-v857 software library.

Firmware project is included in Rialto_Jennic.zip file.

Reference guide are included into Install.zip and are:

1) JN-UG-3064 - Software Developer's Kit Installation and User Guide

2) JN-UG-3007 - JN51xx Flash Programmer User Guide

Install.zip also include JN-SW-4041-SDK-Toolchain-v.1.1.exe and JN-SW-4065-JN516x-JenNet-IP-SDK-v857.exe to install development suite.

For JN5168 modules programming, you must install FlashGUI programmer from JN-SW-4007 (included in Install.zip). Please, note that JN-UG-3007 refers to Flash GUI programmer version 1.8.4, and JN-SW-4047 contains new release 1.8.9 of Flash GUI programmer. See release note document included in JN-SW-4047 package. The release 1.8.9 must be installed for JN516x modules programming.

Install.zip and Rialto_Jennic.zip files can be downloaded from Rialto section of Silica ArchiTech web page (registration needed)

Installing Jennic Developement Suite chapter will guide you through the basic steps of the installation procedure of Jennic Developement Suite

We suggest you to read first the Quick Start Guide to perform a correct Firmware setup.

Quick start guide

This guide explains how to use this application and provides an overview of on the structure of the project firmware

Installing Jennic Developement Suite

This small guide is intended to explain the main steps to properly install the Jennic SDK Toolchain. As possibly not shown here, refer to the document JN-UG-3064. All steps here described are performed with WINDOWS 7 OS

First step

Unpack the file 'Install.zip' that you have downloaded You must find these files:

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File Home Share	View				^ 🕜
Copy Paste Paste shortcut	t Move Copy to ~ Copy to ~ Organize New	ew item • Isy access • Properties	Gpen ♥ Seli Edit 88 Seli Seli History 88 Inve Open	ect all ect none ert selection Select	
🛞 🌛 🔻 🕇 📕 « Local 🛙	Disk (D:) → desk → Lavori → RSR → Jennic → Inst	all → v	C Search Install		,p
🔆 Favorites	Name	Date modified	Туре	Size	
💻 Desktop <u>)</u> Downloads	JN-SW-4007.zip JN-SW-4041-SDK-Toolchain-v1.1.exe	Thu 13-06-2013 11 Thu 30-05-2013 13	Compressed (zipp Application	9.908 KB 153.262 KB	
🖳 Recent places	≫ JN-SW-4065-JN516x-JenNet-IP-SDK-v857.exe ⊉ JN-UG-3007.pdf	Fri 21-06-2013 16:00 Thu 13-06-2013 11	Application Documento Adob	3.448 KB 546 KB	
 Libraries Documents Music Pictures Videos 	™ JN-UG-3064.pdf	Thu 13-06-2013 12	Documento Adob	1.801 KB	
🤣 Homegroup					
P Computer					
Local Disk (D:)					
🙀 Network					
5 items					:==

Then, you are ready for Jennic Developement Suite setup.

Installing Jennic Toolchain JN-SW-4041

Double click on **JN-SW-4041-SDK-Toolchain-v1.1.exe**. Leave unchanged all default setting in the following dialog box. When appear verify checkbox selection as image below

Choose which features of Jenr	nic Toolchain you want to install.	
Check the components you wa install. Click Next to continue.	nt to install and uncheck the cor	nponents you don't want to
Select components to install:	 Cygwin Eclipse Flash Programmer Jennic Compiler Tools 	Description Installs the Eclipse IDE environment
Space required: 412.2MB		
nic Ltd		

During installation, if you don't have Java Runtime on your PC, this popup will appear:

nstalling	4
Please wait while Jennic Toolcha	in is being installed.
Create shortcut: C:\ProgramDat	a Wicrosoft \Windows \Start Menu \Programs \Jennic \JN-SW-4
Output folder: C:\Jennic\cygwi	in\var 🔺
Jennic Toolchain Setup JN-SW-4041-SDK-Toolchair installed	n-v1.1 uses Java 1.6, it will now be downloaded and
Jennic Toolchain Setup JN-SW-4041-SDK-Toolchain installed	n-v1.1 uses Java 1.6, it will now be downloaded and

Click OK button and proceed following Java Installer instructions

Jennic Toolchain Setup	
Installing Please wait while Jennic Toolchain is being installed.	0
Downloading Java Runtime Environment.exe	
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3700kb (3776) 01 13343kb at 220,0kb/s (43 Second	ls remaining)
5700kb (5776) 01 15545kb at 226.0kb/s (45 Second	ls remaining)
5700kb (5776) 01 15575kb at 226.0kb/s (45 Second	ds remaining)
ennic Ltd	ds remaining)

When installation ends, the followiong will appear:

Setup was completed succe	essfully.
Completed	
Output folder: C:\Jennic Created uninstaller: C:\Pr Output folder: C:\Progra Create shortcut: C:\Progr Create shortcut: C:\Progr Output folder: C:\Jennic\ Create shortcut: C:\Jennic\	rogramData \Jennic \updates \JN404x \uninstall_JN-SW-4041 mData \Microsoft \Windows \Start Menu \Programs \Jennic \JN ramData \Microsoft \Windows \Start Menu \Programs \Jennic \J ramData \Microsoft \Windows \Start Menu \Programs \Jennic \J \Tools \flashprogrammer ramData \Microsoft \Windows \Start Menu \Programs \Jennic \J

click "next" button, and setup will ask you to perform a system restart

Jennic Toolchain Setup
Click Yes to restart your computer now
Sì No

click "OK" and wait for restart

Installing JN-AN-4065 library

Double click on **JN-SW-4065-JN516x-JenNet-IP-SDK-v857.exe**. Leave unchanged all default setting in the following dialog box. When appear verify checkbox selection as image below, then click "Next"

Check the components you wa install. Click Next to continue.	nt to install and uncheck the c	omponents you don't want to
Select components to install:	JN516x_JenNet_IP_SD	Description Position your mouse over a component to see its description.
Space required: 7.0MB		

When library installation has finished, Jennic Toolchain is ready to start

Starting Jennic Toolchain

Open Start and go to Jennic -> Eclipse (as show in figure below) click on Eclipse to start program



Jennic Toolchain will ask for workspace. Leave unchanged an click "OK"

Workspace Launcher						
Select a workspace						
Eclipse Platform stores your projects in a folder called a workspace. Choose a workspace folder to use for this session.						
Workspace: C:\Users\test\workspace Browse						
Use this as the default and do not ask again OK Cancel						

Jennic Eclipse will open Welcome tab.



Close Welcome tab by clicking on X red circled in figure above Now the Jennic Eclipse main window will appear

C/C++ - Eclipse Platform							
File Edit Refactor Navigate Search Ru	un Project Window Help						
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						Outli 23	
					An	outline is not availab	e"
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	0 items						
	Description		Resource	Path	Location	Туре	
						<u> </u>	
0 items selected							

Close Eclipse and proceed with next steps.

Installing Flash GUI Tool Programmer

In order to complete development suite setup, you must install Flah Programmer as a external tool. Open file menu, and select "Import"

File	Edit Refactor Navigate	Search Run Proj	ect Window Help
	New Open File	Alt+Shift+N ►	• ® • 🕸 •
	Close Close All	Ctrl+W Ctrl+Shift+W	
	Save Save As	Ctrl+S	
	Save All Revert	Ctrl+Shift+S	
	Move Rename	F2	
\$	Refresh Convert Line Delimiters To	F5	
	Print	Ctrl+P	
	Switch Workspace Restart	•	
2	Import	<	
4	Export		
	Properties	Alt+Enter	
	Exit		

chose "Run/Debug -> Launch Configurations and click "Next" button

Import	
Select Import launch configurations from the local file system.	Ľ
Select an import source:	
type filter text	
 General C/C++ CVS Run/Debug Breakpoints Launch Configurations Tasks Team 	
? < Back Next > Finish	Cancel

click "Browse" button and navigate to C:\Jennic\Tools\eclipse_config and then click "OK"

Import Launch Configurations Import launch configurations from the local file system From Directory: C://Jennic/Tools/eclipse_config Import Launch Configurations Import Computer Import Launch Configuration Import Computer Import Components Import Components Import Components Import Cons Import Social Imp	۲	Import Launch Configurations			۲
From Directory: C:/Jennic/Tools/eclipse_config Browse Import Launch Configurations Import Launch Configurations Import Launch Configurations Import Launch Configurations Import Launch Configuration Import Launch Configuration Import Launch Components Import Launch Configuration Import Launch C	Import Laun	ch Configurations configurations from the local file system			
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Image: Abe Image: Computer Image: Local Disk (C:) Image: Documentation Image: Freescale Image: Local Disk (C:) Image: Documentation Image: Freescale Image: Local Disk (C:) Image: Local Disk (C:) Image: Local Disk (C:) Image: Local Disk		Import Launch Configurations			×
Folder: eclipse_config		be omputer Local Disk (C:) Documentation Freescale Intel Jennic Application Chip Components cygwin Licenses Platform Stack Platform Stack Dointree Daintree Divers clipse clipse clipse_config flashprogrammer			< >
UNA Cancel	Folder: Make Ne	eclipse_config	OK	Cance	

Sign "Flash GUI Tool" and "Flash CLI Tool" checkbox

Please, note that Eclipse default is all tool checked, but as actual for JN5168 application only the two Flash tool are

needed.

Import Launch	Configurations					
Import Launch Configurations Import launch configurations from the local file system						
From Directory:	C:/Jennic/Tools/eclipse_cor	nfig	Browse			
Overwrite exis	sting launch configurations w	Flash CLI Tool.laung Flash GUI Tool.laung Flash GUI Tool.laung HWDebugBinDown Flash GUI Tool.laung Jennic Bash Shell.lau JTAG Server.launch	ch load.launch unch			
0	< Back No	ext > Finish	Cancel			

Click "Finish" button to perform Flash Tools setup.

When finished, you can find the tools in the Run->External Tools menu

They can also be accessed from the drop-down arrow next to the tools symbol, as show in figure below

8 · * · · · 9	• 😕 🗁 🛷 • 🔳 📑 🛓 • 🖓 • 🤝
9	1 Flash CLI Tool
	2 Flash GUI Tool Run As External Tools Configurations
	Organize Favorites

Upgrading Flash GUI tool (for JN5168)

We must upgrade Flash GUI tool to release 1.8.9, because the tool just installed does'n work with JN5168. To make this, unpack the zip file JN-SW-4007.zip into new folder and navigate to **Tools\FlashProgrammer** located inside this new folder.

you can find the JN-SW-4007 file inside Install.zip as show in First step chapter on this document

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File Home Share V	iew				^ 🔞
Copy Paste Copy Copy path	Move Copy to v to v Organize	Easy access •	Properties	Select all	
€ → + ↑ 📕 C:\Users\At	oe\Desktop\JN-SW-4007\Tools\flashprogram	mmer	v C	Search flashprogrammer	p
Favorites	Name	Date modified	Туре	Size	
Desktop	FlashCLLexe	30-01-2013 Wed	1 Application	3.108 KB	
Downloads	FlashGUI.exe	30-01-2013 Wed	1 Application	6.035 KB	
Secent places	FlashProgrammerExtension_JN5168.bin	30-01-2013 Wed	1 BIN File	3 KB	
	S gdiplus.dll	30-01-2013 Wed	1 Application ext	ens 1.661 KB	
🥽 Libraries	s msvcp71.dll	30-01-2013 Wed	1 Application ext	ens 488 KB	
Documents	MSVCP90.DLL	30-01-2013 Wed	1 Application ext	ens 560 KB	
J Music	MSVCR71.dll	30-01-2013 Wed	1 Application ed	ens 340 KB	
E Pictures	MSVCR90.DLL	30-01-2013 Wed	1 Application ext	ens 641 KB	
🖼 Videos	🛋 nxplogo.gif	30-01-2013 Wed	1 GIF File	19 KB	
	w9xpopen.exe	30-01-2013 Wed	1 Application	5 KB	
🜏 Homegroup					
👰 Computer					
bocal Disk (C:)					
👝 Local Disk (D:)					
🙀 Network					
10 items					

Select all files, right click an copy.

Open folder C:\Jennic\Tools\flashprogrammer and paste all file inside this folder.

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🚖 Favorites	^ Name	Date modified	Туре	Size	
E Desktop	FlashCLI	30/01/2013 14:48	8 Applicazione	3.108 KB	
🐊 Downloads	FlashGUI	30/01/2013 14:43	Applicazione	6.035 KB	
Recent places	FlashProgrammerExtension_JN5168.bin	30/01/2013 14:43	File BIN	3 KB	
	🚳 gdiplus.dll	30/01/2013 14:43	Estensione dell'ap.	1.661 KB	
词 Libraries	🗺 jennic	15/01/2008 17:05	immagine GIF	38 KB	
Documents	🔤 JennicLogo	15/01/2008 17:05	i Immagine JPEG	110 KB	
J Music	S msvcp71.dll	30/01/2013 14:43	Estensione dell'ap.	488 KB	
Pictures	MSVCP90.DLL	30/01/2013 14:43	Estensione dell'ap.	560 KB	
Videos	MSVCR71.dll	30/01/2013 14:43	Estensione dell'ap.	340 KB	
	MSVCR90.DLL	30/01/2013 14:43	Estensione dell'ap.	641 KB	
🜏 Homegroup	📰 nxplogo	30/01/2013 14:43	Immagine GIF	19 KB	
	w9xpopen	30/01/2013 14:43	Applicazione	5 KB	
📜 Computer					
🏜 Local Disk (C:)					
👝 Local Disk (D:)					
📬 Network					
IN ABELE					
16 items					

Now Jennic Eclipse setup is complete and the suite is ready for work with Rialto Project!

WINXP TROUBLESHOOTING

INSTALLING DRIVER FOR USB DONGLE

With some release of Windows Xp, you must manually install the USB drivers of the Rialto board.



In this case, go to FTDI driver page download and install Windows driver.

CYGWIN1.DLL TROUBLES WITH WINXP

Jennic SDK Toolchain install CygWin API inside the folder C:\Jennic\cygWin. Some XP installation have the file "cygWin1.dll" inside C:Windowssystem32 folder. This is a cause for fatal error during project building. If it occours, build fails and on the "Console" tab of the Jennic Eclipse you can see one or more messages as follow:

```
290 [main] ? (680) c:\Jennic\Tools\ba-elf-ba2\bin\ba-elf-gcc.exe: *** fatal error -

→ cygheap base mismatch detected - 0x611668E0/0x611688E0.

This problem is probably due to using incompatible versions of the cygwin DLL.

Search for cygwin1.dll using the Windows Start->Find/Search facility

and delete all but the most recent version. The most recent version *should*

reside in x:\cygwin\bin, where 'x' is the drive on which you have

installed the cygwin distribution. Rebooting is also suggested if you

are unable to find another cygwin DLL.
```

To solve this trouble with Jennic Eclipse Builder, we suggest to try to remove file "cygwin1.dll" located inside folder C:\Windows\system32

We suggest to rename the file in your system folder and check if there are no other troubles Be careful if you have other applications that use cygwin!! Removing file from OS system folder must be checked before.

For more detail and further information regarding cygwin, you can visit the cygwin site. For further information about this trouble, click here .

Quick start guide

Hardware requirements

- Silica Rialto Board kit
- One or more USB type-A extension cable
- PC with terminal software (such as HyperTerminal)



Software requirements

- Jennic SDK toolchain (JN-SW-4041), JN5168 stack library (JN-SW-4065) and Flash GUI tool (JN-SW-4007)
- Rialto_Jennic firmware
- PC terminal emulator (such as HyperTerminal)

Note:

If you have not yet installed Eclipse Jennic, before proceeding, go to:

Installing Jennic Development Suite

Hardware setup

Plug Rialto Board into USB port (also using USB type-A extension cable)



with USB type-A extension cable



Wait for properly USB dongle driver installation

Driver Software Installation		×
Installing device driver s	oftware	
USB Serial Port	Searching Windows Update	
Obtaining device driver software Skip obtaining driver software fr	e from Windows Update might take a while. <u>com Windows Update</u>	
		Close

When drivers are ready you can connect one or more Rialto Board (at least two for firmware evaluation)



Tip:

See Control Panel of your PC and note COM Port number configured for each Rialto Board (figure above). For any troubles during USB driver installation in Windows XP see at *WINXP TROUBLESHOOTING*



Connecting two Rialto Board (minimun number for full firmware evaluation), take care at COM number installed on your PC



Serizll plugin

Rialto board has in bottom layer two strip (6 and 4 way) and can be used as a plugin for SerizII.



Important: Before using Rialto boards as SerizII plugin, you must download and install the proper firmware revision of the SerizII board (**SerizRialto.zip**). For all instruction and information about, see at Silica SerizII

Take care plugging Rialto on SerizII: be shure that both boards (Rialto and SerizII) are power off before!!

HyperTerminal settings

Set your HyperTerminal COMx parameter:

speed = 115200 baud data with = 8 parity = none stop bit = 1 flow control = none

Bits per second:	115200	~
Data bits:	8	¥
Parity:	None	v
Stop bits:	1	~
Flow control:	None	~

In Ascci Setup windows, check "Send line ends with line feeds"

Connect To Settings	
 Function, arrow, and Terminal key 	d ctrl keys act as ASCII Setup ?
Backspace key Ctrl+H	ASCII Sending
Emulation:	Echo typed characters locally
Auto detect	Line delay: 0 milliseconds.
Telnet terminal ID:	Character delay: 0 milliseconds.
Backscroll buffer lir	ASCII Receiving
Play sound whe	Append line feeds to incoming line ends
	Force incoming data to 7-bit ASCII
	W rap lines that exceed terminal width
	OK Cancel

Rialto Board FW installation & setup

• In the folder C:\Jennic\Application create new folder named **Rialto_Jennic**

🔒 l ⊋ 🚯 = l		Application			- 🗆 🗙
File Home Share	e View				~ ()
	Computer → Local Disk (C:) →	Jennic + Application +	v C	Search Application	,
Recent places	^ Name	Date modified	Туре	Size	
 ✓ □ Libraries ▷ □ Documents ▷ □ Music ▷ □ Pictures ▷ □ Videos ▷ □ Homegroup 	ilalto_Jennic	05-11-2013 Tue 10:45	File folder		
Computer Computer Computer Computer Components C)				

• Unzip all files from Rialto_Jennic_1_0.zip into the folder C:\Jennic\Application\Rialto_Jennic just created

👪 l 📮 👪 🗢 l	Rialto	Jennic			×
File Home Share	View				× 🕐
📀 🌛 🔻 🕇 📕 « Local	Disk (C:) → Jennic → Application → Rialt	o_Jennic ▶ 🕔	Search R	ialto_Jennic	P
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4 🚍 Librarion	길 .settings	14-10-2013 Mon 1	File folder		
	퉬 Common	22-07-2013 Mon 1	File folder		
Documents	퉬 Doc	30-07-2013 Tue 10	File folder		
V 💕 Music	Rialto_Coord	14-10-2013 Mon 1	File folder		
	퉬 Rialto_EndD	22-07-2013 Mon 1	File folder		
	cproject	05-11-2013 Tue 11	CPROJECT File	93 KB	
No. 8. 11-	project	05-11-2013 Tue 11	PROJECT File	3 KB	
P 😽 Homegroup	Makefile	14-10-2013 Mon 1	File	2 KB	
 Computer Local Disk (C:) Documentation Freescale Intel Jennic 					
4 🍌 Application					
 Rialto_Jennic Chip 					
 B items Components Components 					=

• Go to Start -> Jennic -> JN-SW-404x products -> Eclipse and click on to start Jennic Eclipse



• Check if workspace setting is like figure below. Then click OK to proceed.

Workspace Launcher	
Select a workspace	
Eclipse Platform stores your projects in a folder called a workspace. Choose a workspace folder to use for this session.	
Workspace: C:\Users\test\workspace	▼ Browse
Use this as the default and do not ask again	OK Cancel

• Now you can see the Eclipse Main Window

File Edit Refactor Navigate Search Run Project Window Help Project Explorer Project Explorer <th>C/C++ - Eclipse Platform</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>• ×</th>	C/C++ - Eclipse Platform						• ×
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		Description	Resource	Path	Location	Туре	
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• Select menu File -> Import

e c	/C++ - Eclipse Platform		
File	Edit Refactor Navigate	Search Run Project	Window Help
	New Open File	Alt+Shift+N ►	S ▼ ☆ ▼
	Close	Ctrl+W	
	Close All	Ctrl+Shift+W	
	Save Ar	Ctrl+S	
	Save All	Ctrl+Shift+S	
	Move		
69	Refresh	F2 F5	
	Convert Line Delimiters To	•	
	Print	Ctrl+P	
	Switch Workspace Restart	F	
2	Import		-
4	Export		
	Properties	Alt+Enter	
	Exit		

• In the dialog box that will open, click on **General**, select **Existing Projects Into Workspace** and after click "Next" button: new dialog will open.

Import	
Select Create new projects from an archive file or directory.	Ľ
Select an import source:	
type filter text	
 General Archive File Existing Projects into Workspace File System Preferences C/C++ CVS Run/Debug Tasks Team 	
? < Back Next > Finite	sh Cancel

• Click on "Browse..." button an navigate to C:\Jennic\Application\Rialto_Jennic folder. Click on "OK" button

•	Import	_ □	
Import Projects Select a directory to se	earch for existing Eclipse projects.		
• Select root director	y:	Browse	2
○ Select archive file	Browse For Folder	×	
Projects:	Select root directory of the projects to import	~	
0	Make New Folder OK C	Cancel	

• Check options and setting as the image below, then click "Finish" button to import project.
¢	Import	- 🗆 🗙
Import Projects Select a directory to sear	rch for existing Eclipse projects.	
 Select root director Select archive file: 	C:\Jennic\Application\Rialto_Jennic	Browse
Projects:		
Rialto_Jennic (C:	\Jennic\Application\Rialto_Jennic)	Select All
		Deselect All
		Refresh
Cojy projects into w	orkspace	
0	< Back Next > Finish	Cancel

• Wait for project import, then you can see Rialto_Jennic project in the Project Explorer windows of Eclipse Platform.

۲							
File Ed	it Refactor	Navigate	Search	Run	Project	Window	Help
- 13		1	<u>8</u> - C	• •	3 - 1	s - 🔊 -	
Proje	ect Explorer 8	3		69 V			
	Rialto_Jennic						

• First of all, right click over "Rialto_Jennic" in the Project Exporer window, then select "Clean Project". After cleaning, a first build will start automaticaly



• Take care at image above. Expand project, and see at "Console" tab: you can find a log that ends with "Generating binary Rialto_Coord_JN5168.bin"



Tip: If you can't see in the "Console" tab the message above, make shure that "Build Automatically" option (inside "Project" menu) is set



Note: The binary file for Coordinator has been generated and ready for Rialto Board programming

Tip: don't care if you have this warning (see Problems tab).

8	Proble	ems 🛛	🖉 Tas	sks 📮	Conso	le 🔳	Prope	erties			
0 er	rors, 1	warning,	0 others								
De	scripti	on								-	
4	🕭 W	/arnings (1	item)								
	2	Error lau	inching e	externa	al scanne	r info	genera	ator (gcc	-E -P -1	/ -dD C:/	/Users/test

• Now you can build End_Node project. Click on drop-down arrow next to Hammer Icon (blue circled in image below)

\$	
File Edit Refactor Navigate Search	Run Project Window Help
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Project Explorer 🛛 🗖 🗖	1 Rialto Coord
	2 Rialto_EndD
▲ E Rialto_Jennic ▷ M Includes	
Common	
Doc 🦳	
A Bialto_Coord	
Build	
A 🗁 Source	

then click on "Rialto_EndD". Build will start.

۲	C/C++ - Eclipse Platform	- 🗆 🗡
File Edit Refactor Navigate Sear	rch Run Project Window Help	
	· • ♂ • ﴿ • ﴾ • ﴾ • ○ • ♀ • ﷺ • ◎ ⇔ ৵ • Ⅲ ■ ½ • ♀ • ⇔ • · · · ·	C/C++
Project Explorer 🛛 🗖 🗖		
Image: Second secon		An outline is not available.
Build	😂 Build Project – 🗆 🗙	
application.o AppQueueApi.d AppQueueApi.o Makefile	Building project	
Rialto_Coord_JN516	Invoking Command: make all	
☐ Rialto_Coord.d ☐ Rialto_Coord.o ⊘ Source ○ Makefile	Always run in background Run in Background Cancel Details >>	
i Raito_Endu i Build i Source i Makefile i Makefile		
	Tasks ☐ Properties È Problems ♀ Console ☆	
< >>	-I/cygdrive/c/Jennic/Components/TimerServer/Include -I/cygdrive/c/Jennic/Components/PDM/Include /cygdrive/c/Jennic/Application/Rialto_Jennic/Common/Source/application.c -MD -MF application.d -MP v	
📑 🖓 🖓 Rialto_Jennic	Build Project: (20%)	

• When build has finished, in the Project Explorer tab expand Rialto_Coord and Rialto_EndD Build folders. The result in image below.



You have built the two binary files and you are ready for program Rialto Board

Programming Rialto Board with Flash GUI Tool

Before starting Flash GUI programmer tool, you must connect Rialto Board whit built-in USB dongle. Please refer to Hardware Setup chapter on this document to check connection

• Flash Gui Tool can be accessed by clicking on the drop-down arrow next to Tools Symbols on the toolbar, then selecting "Flash GUI Tool"

S - \$ - 0 - 0	0	- 🖉 🗁 🖉 - 🔳 🖬 🖕 😓 - 🏷
	0	1 Flash CLI Tool
	Q.	2 Flash GUI Tool
		Run As 🕨
		External Tools Configurations
		Organize Favorites
	_	

Dont't care of error in Console tab: no troubles or malfunctioning will be affect board program!

Problems	🖉 Tasks	📮 Console 🛛 🔲 Propertie	es				= ×	💥 🖹 🚡		🛃 🖳 🕶 📫 🕈		Ē
Flash GUI Tool [Program] C:\Jennic\Tools\flashprogrammer\FlashGUI.exe												
16:04:30:	Debug:	<pre>src/helpers.cpp(140):</pre>	'CreateActCtx'	failed wi	th error	0x000007b	(impossibile	trovare	il file	specificato	.)	~
											-	-
*											P.	
												_

• See at Flash GUI windows: check if version is **1.8.9**. If not, refer *Upgrading Flash GUI tool (for JN5168)* on **Installing Jennic Developement Suite** guide

nnguration	
ogram:	Browse Clear History
M Port: COM4 Refresh Connect: V Skip Verification:	
rget: Detect Flash ▼ Baud Rate: 38400 ▼	
	Browse
ctor 3: Save Programming: Erase 🔻 Flash Select: Internal 💌	
	▼ Browse
wice	Control
vice: Hash:	Carrier Board or USB Dongle
Choose how you want to assign the MAC address	Automatic Program and Reset V
Use MAC address embedded in application binary	
Reuse existing MAC address in target device (shown in MAC Address field below)	RESET Dongle
Use next available MAC address from MAC address list file Type new MAC address (in MAC Address field below)	
MAC Address List File	Action
Browse	Program
MAC Address (Hex)	Erase EEPROM
00 00 00 00 00 00 00 00 Refresh	About

- **Step 1**: make these actions:

1) Check and/or select appropriate COM port (green circled).

You can find find out which serial communications port your PC has allocated to the Rialto Board by checking in the Control Panel->Hardware->device Manager->COM port

2) Click on "Refresh" button (blue arrow) and check the result (orange circled): if device not appear, check cable and USB connection (COM port installed)

3) Select in the Baud rate drop-down menu "500000" (for maximun programming time performace)

4) Check "Automatic Program and Reset" checkbox (brown arrow)

P JN51xx Flash Programmer 1.8.9	
Configuration	
Program:	Browse Clear History
COM Port: COM4 Refresh Connect: Skip Verification: COM1 COM1 COM2 COM4 Baud Rate: S00000 V COM4 Baud Rate: S00000 V COM4 Baud Rate: S00000 V COM4 Baud Rate: S00000 V COM4 STOOD V	
iector 3: Save Programming: Erace 500000 1000000 Select: Internal ▼	Browse
Device	Control
Device: JN5168, BL 0x00080006 Flash: Internal Flash (256K)	Carrier Board or USB Dongle
Choose how you want to assign the MAC address	Automatic Program and Reset 🔽 🤇
Use MAC address embedded in application binary	
Reuse existing MAC address in target device (shown in MAC Address field below) June part available MAC address from MAC address list file	RESET Dongle
Type new MAC address (in MAC Address field below)	
MAC Address List File	Action
Rowce	Program
MAC Address (Hex)	Erase EEPROM
00 15 8d 00 00 32 d7 7e Refresh	About
□ A to be served at the set of t	
Auto-increment Address	

Note: Take care at COM port: if it's already busy with other applications (such as HyperTerminal), you cannot find it in COM port dropdown menu of Flash GUI Tool

• Step 2: click "Browse" button red circled, navigate to C:\Jennic\Application\Rialto_Jennic\Rialto_Coord\Build and select bin file "Rialto_Coord_JN5168.bin". Then click "Open" button.

		NXP JN51xx Flash Programmer 1.8.9	Л	- U X	
Configurati	on		X		
Program:			Browse Clear His	story	
COM Port:	✓ Refresh	Connect: 🖌 Skip Verification: 🖌	\smile		
Target:		Choose a file			
-	€ 🕘 ▾ ↑ 퉬 « Rialto_J	ennic → Rialto_Coord → Build	✓ C Search Buil	d	,
Sector 1	Organize 🔻 New folder			i≡ • III	0
	🊢 Local Disk (C:)	^ Name	Date modified	Туре	
	Documentation	Rialto_Coord_JN5168.bin	05-11-2013 Tue 11	BIN File	
	Jotel	L			
Device					
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Us Ty MAC	Common Coc Rialto_Coord Suild Source Rialto_EndD				
	Common Common Cond C	v <			
	Common Common Coc Rialto_Coord Build Source Rialto_EndD Chip File name:	< ▼ < Rialto_Coord_JN5168.bin	→ JN51xx bin	ary file (*.bin)	~
	Common Doc Rialto_Coord Build Source Rialto_EndD Chip File name:	< <p>Rialto_Coord_JN5168.bin</p>	JN51xx bin	ary file (*.bin)	~

- **Step 3**: in the "Program" window will appear

C:\Jennic\Application\Rialto_Jennic\Rialto_Coord\Build\Rialto_Coord_JN5168.bin.

Clik on "Program" button to start board programming.

N	XP JN51xx Flash Programmer 1.8.	9	- 🗆 🗙			
Configuration						
Program: C:\Jennic\Application\Rialto_Jennic\Rialto_Coord\Build\Rialto_Coord_JN5168.bin v Browse Clear History						
COM Port: COM4 Refresh	Connect: 🖌 Skip Verification: 🗸					
Target: Detect Flack v a varia						
Baud Rate: 50	0000 👻					
		~	Browse			
Sector 3: Save Programming: Erase	✓ Flash Select: Internal ✓					
	Programming C:\lennic\					
	i rogianning cipernie (iii	¥	Browse			
Device	Programming C:\Jennic\Application\Rial	Control				
Device: JN5168, BL 0x00080006 Flash:	Carrier Board or USB Dongle					
Choose how you want to assign the MAC addres	Elapsed time : 0:00:03	Automatic Program and Reset 🗹				
Use MAC address embedded in application bir	Estimated time : 0:00:08					
Reuse existing MAC address in target device Use next available MAC address from MAC ac	Remaining time: 0:00:05	RESET Dongle				
O Type new MAC address (in MAC Address field	below)					
MAC Address List File		Action				
MAC Address (Hex)		Erase EEPRO	м			
00 15 8d 00 00 32	d8 3c Refresh	About				
Auto-Increment Address						

• Step 4: wait for verifyng...

	NXP JN51xx Flash Programmer 1.8.	9 – 🗆 🗙
Configuration		
Program: C:\Jennic\Application\Rialto_Jennic\	Rialto_Coord\Build\Rialto_Coord_JN5168.bin	Browse Clear History
COM Port: COM4 Refresh	Connect: 🗹 Skip Verification:	
Target: Detect Flash ✓ Baud Rate:	500000 ¥	
		✓ Browse
Sector 3: Save Programming: Era	Verifying program in flash	×
	Verifying 330 blocks of 128 bytes	Browse
Device		ntrol
Device: JN5168, BL 0x00080006 F Choose how you want to assign the MAC a	Elapsed time : 0:00:02 Estimated time : 0:00:06	Carrier Board or USB Dongle Automatic Program and Reset ✔
Use MAC address embedded in applicable Reuse existing MAC address in target de	Remaining time: 0:00:04	DECET Decide
Use next available MAC address from M. Type new MAC address (in MAC Address	Cancel	RESET Dongle
MAC Address List File		Action
	Program	
MAC Address (Hex)		Erase EEPROM
00 15 8d 00 00 33	2 d8 3c Refresh	About
Auto-Increment Address		

• Step 5: Click "OK" button and board will reset and start.

onfiguration rogram: C:\Jennic\Application\Rialto_Jennic\Rialto_Coord\Build\Rialto_Coord_JN5168.bin DM Port: COM4 Refresh Connect: Skip Verification:	V Browse Clear History
rogram: C:\Jennic\Application\Rialto_Jennic\Rialto_Coord\Build\Rialto_Coord_JN5168.bin OM Port: COM4 Refresh Connect: Skip Verification:	Browse Clear History
OM Port: COM4 Refresh Connect: Skip Verification:	
arget: Detect Flash V Baud Rate: 500000 V	
	✓ Browse
ector 3: Save Programming: Erase V Flash Select: Internal V	
Program successfully writ	ten to flash
Use MAC address embeddet Reuse existing MAC address Use next available MAC address Use next available MAC address from the address institute Type new MAC address (in MAC Address field below)	ОК
MAC Address List File	Action
Browse	Program
MAC Address (Hex)	Erase EEPROM
00 15 8d 00 00 32 d8 3c Refresh	About
O Use next available MAC address monthmac address instance O Type new MAC address (in MAC Address field below) MAC Address List File	Action

2 Tip: То program End-Node, repeat from but navigate step to C:\Jennic\Application\Rialto_Jennic\Rialto_EndD\Build and select "Rialto_EndD_JN5168.bin" When you have programmed even Coordinator that End-node, you can select FW binary by clicking the drop-down arrow (red circled in image below) and select from drop-down menu

	NXP JN51xx Flash Programmer 1.8.9		_
Configurati	on		
Program:	C:\Jennic\Application\Rialto_Jennic\Rialto_EndD\Build\Rialto_EndD_JN5168.bin	Browse	Clear History
COM Port:	C:\Jennic\Application\Rialto_Jennic\Rialto_EndD\Build\Rialto_EndD_JN5168.bin C:\Jennic\Application\Rialto_Jennic\Rialto_Coord\Build\Rialto_Coord_JN5168.bin		
Target:	Detect Flash V Baud Rate: 500000 V		

Now you have finished all setup necessary to evaluate, debug and make changes inside Rialto Firmware.

You can plug the Rialto boards into USB ports of your PC, open HyperTerminal sessions and use Serial Monitor command for evaluate the main Firmware functions. For further details you can read the guides:

Serial Monitor guide

Tip & Tricks

"Ready to run" Rialto Kit

Ready to run is a pre-programmed kit that perform basic function for Jennic evaluation purpose. We can find two Rialto board, first one as Coordinator and second as End-Node.



Important: Before using Rialto Boards as a SerizII plugin, read note inside 'important' box on chapter *SerizII* plugin

Working with Rialto board

Simply use of Rialto Board, is to plug Coordinator and End-Node on two USB port of your PC See at com port configured, and then open two HyperTerminal sessions to evaluate Rialto network

Coordinator Serial Monitor main menu

	COMx_Rialto - HyperTerminal	- 🗆 🗙
File Edit View Call Transfer Help		
다 🗃 省 🖏 🖏 🖏		
**************************************	** * **	
PAN.ID value = 0xcafe Coordinator Module FW 1.00 Verbose mode enabled		
Command format: 'W' + [node id] + [string] se 'N' read network status 'c' + [PAN.ID] configure only 'C' + [PAN.ID] configure all 'M' this menu 'I' init system (set device P 'R' system restart 'S' request End-Node ADXL362 '3' request End-Node SENS300 '!' Disable verbose mode 'x or X' spi read test Type M for menu ?>_	nd data to node Coordinator network AN.ID to default Jennet parameter) data data	
Connected 00.00.15 ANSIW 11520	00 8-N-1 SCROLL CAPS NUM Capture Print echo	· · · · · · · · · · · · · · · · · · ·

End-Node Serial Monitor main menu



By default, Coordinator has "verbose mode" enabled and End-Node has "auto send sensors data" enabled. "Verbose

mode" shows for every transaction (both TX and RX) more data detail, such as HEX format (enclosed in square bracket) When verbose mode is disabled, Serial Monitor gets out only the string or data. It is useful to receive VCARD data from SerizII and save these in VCF format.

"Auto send sensors data" performs read&send sensors data (ADXL362 and SENS300), every time that End-Node receive a poll from Coordinator. When disabled, auto send function will not work.

Note: For more details about Serial Monitor, see Serial Monitor guide

First Lab

The Lab1 that you can perform, is by following the next steps:

- Connect Coordinator and End-Node Rialto boards on USB port of your PC
- Open terminals, connect appropriate serial port and check correct settings (see *HyperTerminal settings*)
- Wait for network connection (blue-led will flash fast both in Coordinator and End-Node)
- See at red-led flash (poll, trasmit or receive, default is 8 seconds)
- See at terminals windows: you can see regullary (every poll-time), both coordinator and end-node, details of sensors data trasmitted and received
- Disable End-Node "Auto send sensors data" typing command '!'.
- Change End-Node PAN.ID (i.e. 1234) typing 'C' command. Board will restart and then wait for new Coordinator (blue-led flash slow)
- See blue-led of Coordinator board: when it flash slow, the Coordinator detect poll failure and automatically dissociate End-Node (it will take about 30-35 seconds). Serial monitor will inform when it occur.
- Now change Coordinator PAN.ID ('C' command) and set same as End-Node previously changed (i.e. 1234) Coordinator restarts itself.
- In a few seconds, End-Node will reassociate with new Coordinator and start to send sensors data.
- Enter End-Node sleep mode (typing 'Z' command). When leds off, plug out End-Node. It will send every 15 seconds sensors data to Coordinator. In sleep-mode the power drain by the end-node is very low. You can take out from USB port and the End-node will run on the small supercap on the board for few minutes.

Important: Sleep Wake Time can be set changing default definition in define.h file. For more information, read *Poll* and *Sleep settings*

Lab 2 with Serizll

The purpose af Lab2 is to show how to add a new end-node to an exhisting network, by setting authomatically the end-node PAN-ID to mach the exhisting network PAN-ID. The processo is: - the network is running (coordinator on PC) - the end-node to be added, which is the SerizII, will read the PAN-ID stored on the NTAG on the ccordinator. - the end-node PAN-ID is set to the network PAN-ID - data can be now exchanged by end node to coordinator, the Vcard data.

Rialto board is designed as a SerizII plugin (see *SerizII plugin*). In Lab1, plug End-Node board on SerizII and Coordinator on USB port of your PC. If you want, you can connect Rialto End-Node board, plugged on SerizII, to PC using USB type-A extension cable. Serial Monitor will run, without affecting SerizII communications. Then, follow next steps:

- Open terminals, connect appropriate serial port and check correct settings (see *HyperTerminal settings*)
- See SerizII display: it will inform that JN5168 End-Node is installed.
- Wait for End-Node restart. See blue-leds flash, that will be slow. No network connection and no device associated. (You can also verify by typing 'N' command on Coordinator serial monitor)
- If the PC serial monitor is connect to the End-Node, on main menu you can see that 'Auto send sensors data' is disabled, because of this is a default setting by SerizII connection.
- Take Coordinator near SerizII RFID antenna: the Seriz will read the Coordinator PAN.ID from the onboard Ntag. SerizII will update the End-Node PAN.ID.
- End-Node will restart, and in a few seconds will be associated to the Coordinator.
- Blue-leds will flash fast to indicate that Network is connected, and also the SerizII display will show this.
- Disable verbose mode on the Coordinator (typing '!' command)
- Place the business card in near SerizII RFID antenna; see at Serial Monitor windows of Coordinator and you can see all data readed from business card.
- You can copy and paste business data (using NotePad) and save this file with extension **.vcf** and directly import to your contact database.

Important: When End-Node is connected to SerizII, Sleep mode entering is not allowed. Even 'Auto send sensors data' is disabled, but you can enable it using '!' Serial Monitor command.

Lab 3 with Serizll

The purpose af Lab3 is to show how to add a new end-node to an exhisting network, by setting authomatically the end-node PAN-ID to mach the nexhisting network PAN-ID. The processo is: - the network is running (ccordinator on SerizII) - the default address of the end-node to be added is read by Seriz from the NTAG on the end-node - the coordinator is set to the end-node read PAN-ID, to be able to comunicate with the end-nod to be added - the end-node PAN-ID is set to the network PAN-ID - the coordinator is put back on the original networn PAN-ID, to which the end-node is now added

In Lab3, plug Coordinator on SerizII and End-Node on USB port of your PC. Simillary to Lab2, you can connect Rialto Coordinator board, plugged on SerizII, to PC. After this, see here steps for Lab2.

- Open terminals, connect appropriate serial port and check correct settings (see *HyperTerminal settings*)
- See SerizII display: it will inform that JN5168 Coordinator is installed.
- Wait for Coordinator restart: blue-led will flash slow, no network is connected.
- Take End-Node near SerizII RFID antenna: the Seriz will read the End-Node PAN.ID from the onboard Ntag. SerizII will update the Coordinator PAN.ID, wait for End-Node association and will perform update of End-Node PAN.ID to the previos network PAN.ID.
- Wait for End-Node restart, and in a few seconds it will associate to the Coordinator.
- End-Node, every time that receive poll command, send sensors data to Coordinator. You can see these data both Coordinator and End-Node Serial Monitor windows
- SerizII display show sensors data received and network state for each End-Node associated: short Network address and state (Sleep or not). You can verify also using Serial Monitor command 'N'.
- Now place End-Node in 'Sleep mode': SerizII will show the End-Node new state (sleep) and receive (every Sleep Wake Time) End-Node sensors data.

Important: Sleep Wake Time can be set changing default definition in define.h file. For more information, read *Poll* and *Sleep settings*

After this 3 Labs, use Serial Monitor guide and enjoy with Rialto Boards!!

Firmware specification

Firmware overview

The Rialto_Jennic firmware has been developed using JN-AN-1174-JN516x-802-15-4-Application-Template skeleton code.

This template include basic application of IEEE802-15-4 stack and some callback function that can be personalized and help end-user application development.

More detail regarding the structure of this template can be found on document

"JN-AN-1174-IEEE802.15.4-App-Template.pdf" inside "Doc" folder included in Rialto_Jennic zip file



JN-AN-1174-IEEE802.15.4-App-Template.pdf reference manual refers to other documents in this folder, especially for:

IEEE 802.15.4 Wireless Networks User Guide (JN-UG-3024) IEEE 802.15.4 Application Development Reference Manual (JN-RM-2024) This is the complete set of guides to know the structure and operation of the skeleton code contained in the template

Other documents:

JN-UG-3087-JN516x-Integrated-Peripherals-API.pdf JN516x integrate peripherals API user guide (hardware library functions details)

JN-DS-JN5168MO-1v2.pdf JN5168 module hardware manual

JN516X.pdf JN5168 wireless microcontroller data sheet.

Firmware restrictions

The application skeleton assumes the following restrictions (directly derived from JN-AN-1174 Application Template):

- You have one device which will act as the PAN Co-ordinator.
- You have at least one other device which will act as an End Device.
- You will use pre-determined values for the PAN ID and the short addresses (for the PAN Co-ordinator and for the End Device(s)).
- The network topology will be a Star network.
- The network will be non-beacon enabled (meaning that the PAN Co-ordinator will not transmit regular beacons).
- Short addressing will be used.
- Data transfers will be direct transmissions with acknowledgements.
- There will be no security implemented.

Main firmware features

Rialto_jennic firmware is based on IEEE802.15.4 network stack. The application also features a serial monitor which, with simple control commands, allows you to evaluate the status of the network and perform basic functions of data transmission / reception. The network topology is a "star", with one Coordinator and more End-Node. The coordinator accepts up to a maximum of 8 End-Node, assigns them a short address and operates a regular polling of all devices associated to check your status. When a End-Node poll fails for 4 next times, the node is automatically dissociated from the Coordinator. Similary, when End-Node doesn't receive poll and the polling timeout is expired, dissociates itself automatically and restarts the scan sequence to search for a coordinator. This is needed because that the network stack IEEE802.15.4, included in the JN-SW-4065 libraries, doesn't seem manage orphan devices. In other words, this mode of operation (polling) allows for constantly monitoring the status of the network and update the presence or absence of networked devices.

Rialto Board End-Node firmware implements a demonstration of Low Power functionality. Using Serial Monitor command 'Z', you can place the board in "sleep mode". As a result, Serial Monitor will be disabled, and any Serial Monitor commands will not performed when board is in sleep mode. Please note that restart is the only way to exit from sleep mode.

Project structure



The application's file structure includes the following folders:

- Rialto_Coord contains source files and makefiles for the PAN Co-ordinator
 - **Rialto_Coord.c** specific application file for Coordinator functions (see chapter 3.2.1 of "JN-RM-2024" resource manual for main details)
- Rialto_EndD contains source files and makefiles for an End Device
 - Rialto_EndD.c specific application file for End-Node functions (see chapter 3.2.2 of "JN-RM-2024" resource manual for main details)
- Common contains:
 - application.c common functions used both by coordinator that end-node
 - application.h common functions and variables global definition
 - define.h common costant defines
 - config.h network parameter and macro definition

Firmware & documents download

Firmware project file Rialto_Jennic.zip, installation file Install.zip and all other documentation for the Rialto project can be found at Silica ArchiTech page. Registration is needed to access at download section. Click here to go to ArchiTech main page.

Serial Monitor guide

Using serial monitor

You can use USB built-in dongle on Rialto Board for programming or Serial Monitor purpose.

The only attention is that you must "deselect" COM port in the Flash GUI Tool (or close program) before connect with Terminal (i.e. HyperTerminal)

This is because the same COM port is used by Flash Programmer and (when application firmware starts) by Serial Monitor.

Example: if your Rialto Board is connected to COM4, if possible, change COM Port settings in Flash GUI Programmer BEFORE attempting to connect HyperTerminal

Best way is to close NXP Flash GUI Tool before connect Terminal to device COM port.



Note: Startup messages are same in End-Node and Coordinator

Coordinator Serial Monitor

When Coordinator is power up, it sends (in sequence):

and after starts main menu as follow:

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**************************************	** * *	
Coordinator Module FW 1.00 Verbose mode enabled		
Command format: 'W' + [node id] + [string] se 'N' read network status 'c' + [PAN.ID] configure only 'C' + [PAN.ID] configure all 'M' this menu 'I' init system (set device F 'R' system restart 'S' request End-Node ADXL362 '3' request End-Node SENS300 '!' Disable verbose mode 'x or X' spi read test Type M for menu ?>_	nd data to node Coordinator network WAN.ID to default Jennet parameter) data data	*
Connected 00.00.15 ANSIW 1152	00.8-N-1 SCROLL CAPS NUM Capture Print echo	

Serial Monitor main messages and commands

• End-Node detected and associated

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PAN.ID value = 0xcafe Coordinator Module FW 1.0 Verbose mode enabled	0	
Command format: 'W' + [node id] + [string 'N' read network status 'c' + [PAN.ID] configure 'C' + [PAN.ID] configure 'M' this menu 'I' init system (set dev: 'R' system restart 'S' request End-Node ADXI '3' request End-Node SENS '!' Disable verbose mode 'x or X' spi read test	7] send data to node only Coordinator all network ce PAN.ID to default Jennet parameter) 362 data 300 data	
Type M for menu ?>End-Node node associate	d! id = 0x1	
Type M for menu		
Connected 00.02.54 ANSIW	115200 8-N-1 SCROLL CAPS NUM Capture Print echo	

• End-Node poll fail and dissociated (details orange circled)

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File Edit View Call Transfer Help				
Coordinator Module FW 1.00 Verbose mode enabled Command format: 'W' + [node id] + [string] send data to node 'N' read network status 'c' + [PAN.ID] configure only Coordinator 'C' + [PAN.ID] configure all network 'M' this menu 'I' init system (set device PAN.ID to default Jennet parameter) 'R' system restart 'S' request End-Node ADXL362 data '3' request End-Node SENS300 data '!' Disable verbose mode 'x or X' spi read test Type M for menu				
<pre>?>End-Node node associated! id = 0x1</pre>				
Type M for menu ?>poll fail! End_node dissociated id->0x1 short->0x1 numfail>0xffffffff Type M for menu				
<u>?></u>				
Connected 00.05.41 ANSIW 115200 8-N-1 SCROLL CAPS NUM Capture Print echo				

• Send data to End-Node ("W" command)

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PAN.ID value = 0xcafe Coordinator Module FW 1.00 Verbose mode enabled Command format: 'W' + [node id] + [string 'N' read network status 'C' + [PAN.ID] configure of 'C' + [PAN.ID] configure of 'N' this menu 'I' init system (set devic 'R' system restart 'S' request End-Node ADXL 'S' request End-Node ADXL '3' request End-Node SENS '!' Disable verbose mode 'x or X' spi read test Type M for menu ?> Type the string in the fo 'end-node address(decimal	0] send data to node only Coordinator all network ce PAN.ID to default Jennet parameter) 362 data 300 data 11owing format:), string(ascii)'	
V.DATA-1, test	bort with 'end' key care at command format: [end-node address] + comma -	+ [string to send]
Connected 00.08.05 ANSIW	115200 8-N-1 SCROLL CAPS NUM Capture Print ec	ho

- Sendig data to End-Node result Red circled: detail of data message Blue circled: sending End_Node address Green circled: data string hex format

Yellow circled: data string terminator (same for all data sending)

Orange circled: Data sending result

COMx_Rialto - HyperTerminal	 ×
File Edit View Call Transfer Help	
<pre>'x or X' spi read test Type M for menu ?>End-Node node associated! id = 0x1 Type M for menu ?> Type the string in the following format:</pre>	
<pre>'end-node address(decimal), string(ascii)' cond with 'ontor' key abort with 'ond' key W.DATA>1,test data string = 1 test End-Node address 0x1 hex data to send' [0x74][0x65][0x73][0x74][0xd][0xa][0x0] Data to send len = 0x7; add = 0x1; string = test Data transmitted Type M for menu ?>frame tx ok!!</pre>	
Type M for menu ?> Connected 00.03.08 ANSIW 115200 8-N-1 SCROLL CAPS NUM Capture Print echo	

Important: In the Coordinator Monitor W command will send a "string" to a selected End_Node. You can see the received message inside End_Node Serial Monitor addressed by Coordinator

• Network status (**"N" command**)

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							1^
Network status	3:						
End node number	$1 \rightarrow MACh$	0x158d00 - MA	.C1 0x32d77	'e - Noo	le.id =	= 1 - Sleer	> 0
End node number	2> MACh	0x158d00 - MA	.C1 0x32d84	ld - Noc	le.id •	= 2 - Sleer	p 0
Type M for menu ?>_	L						
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• Set Coordinator PAN.ID (**'c' command**)

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<pre>************************************</pre>		
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Please, note that 'c' command (lowercase) set only coordinator PAN.ID. To configure all network PAN.ID, use 'C'

command (uppercase)

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C 🖆 🍘 🕉 🗈 🗃	
Command format: 'W' + [node id] + [string] send data to node 'N' read network status 'c' + [PAN.ID] configure only Coordinator 'C' + [PAN.ID] configure all network 'N' this menu 'I' init system (set device PAN.ID to default Jennet parameter) 'R' system restart 'S' request End-Node ADXL362 data 'S' request End-Node SENS300 data 'I' Disable verbose mode 'x or X' spi read test Type M for menu ?> Type new Coordinator PAN.ID value (4 digit HEX) set with 'enter' key - abort with 'end' key PAN ID1234 New Coordinator PAN.ID = 0x1234 pan=0x1234; p=0xaa551234 Restart system to set new pan.id configuration wait	
Connected 00.09.46 ANSIW 115200 8-N-1 SCROLL CAPS NUM Capture Print echo	

• Set network PAN.ID ("C" command)



See image below:
 Red circled: detail of PAN.ID configuration message
 Blue circled: PAN.ID message status
 Green circled: PAN.ID network global settings



after system restart

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[] 역 대 중 등 중 등				
<pre>************************************</pre>	send data to node vertical to node ly Coordinator l network PAN.ID to default Jennet parameter) 2 data 0 data			
Connected 00.00.17 ANSIW 11	5200 8-N-1 SCROLL CAPS NUM Capture Print echo			

• Default PAN.ID (**"I" command**)

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***************************************	*****							
PAN.ID value = 0xcafe	n							
Verbose mode enabled	0							
Command format: 'W' + [node id] + [string 'N' read network status 'c' + [PAN.ID] configure 'C' + [PAN.ID] configure 'M' this menu 'I' init system (set devi 'R' system restart 'S' request End-Node ADXL '3' request End-Node SENS '!' Disable verbose mode 'x or X' spi read test] send data only Coord: all network ce PAN.ID 4 362 data 300 data	a to node inator c to defau:	e lt Jenn	net pa	arameter	•)		
Type M for menu ?>pan=0xcafe; p=0x0 pan=0xcafe; p=0xaa55cafe Restart system to set new pan.id configuration wait								
Connected 00.17.34 ANSIW	115200 8-N-1	SCROLL	CAPS	NUM	Capture	Print echo		

• Request End-Node ADXL362 data (**"S" command**)

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요즘 🛯 🖉 🐨		
PAN.ID value = 0xcafe Coordinator Module FW 1.00 Verbose mode enabled		
Command format: 'W' + [node id] + [string] 'N' read network status 'c' + [PAN.ID] configure of 'C' + [PAN.ID] configure a 'M' this menu 'I' init system (set device 'R' system restart 'S' request End-Node ADXL3 '3' request End-Node SENS3 '!' Disable verbose mode 'x or X' spi read test	send data to node mly Coordinator all network ce PAN.ID to default Jennet parameter) 362 data 300 data	
Type M for menu ?> Type End-Node address to r 'end-node address(decimal) send with 'enter' key - ah S to End-Node>1	request ADXL362 data read: bort with 'end' key	· ·
Connected 00.01.36 ANSIW	115200 8-N-1 SCROLL CAPS NUM Capture Print echo	

• Received End-Node ADXL362 data

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File Edit View Call Transfer Help			
<pre>send with 'enter' key - abort with 'end' key S to End-Node>1 data string = 1.S; End-Node address 0x1 hex data to send: [0x53][0x3b][0xd][0xa][0x0] Data to send len = 0x5; add = 0x1; string = S; Data transmitted Type M for menu ?>frame tx ok!! Type M for menu 2></pre>			
<pre>frame received len = 0xf ADXL362 data from End-Node 0x1: Xaxis=0xffc7; Yaxis=0xfff8; Zaxis=0x47f; TempSensor=0x1cf data string in hex format: [0x53][0x3b][0xff][0xc7][0xff][0xf8][0x4][0x7f][0x1][0xcf][0x0][0x1][0xd] x0]</pre>	[0x	a][()
Type M for menu ?>			
Connected 00.20.22 ANSIW 115200 8-N-1 SCROLL CAPS NUM Capture Print echo			

• Request End-Node SENS300 data (**"3" command**)

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File Edit View Call Transfer Help		
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PAN.ID value = 0xcafe Coordinator Module FW 1.00 Verbose mode enabled Command format: 'W' + [node id] + [string] send 'N' read network status 'c' + [PAN.ID] configure only Cd 'C' + [PAN.ID] configure all net 'M' this menu 'I' init system (set device PAN. 'R' system restart 'S' request End-Node ADXL362 dat '3' request End-Node ADXL362 dat '1' Disable verbose mode 'x or X' spi read test Type M for menu ?> Type End-Node address to request 'end-node address (decimal)' send with 'enter' key - abort vo	data to node mordinator work ID to default Jennet parameter) a a B SENS300 data read: th 'end' key	
Connected 00.03.35 ANSIW 115200 8-	N-1 SCROLL CAPS NUM Capture Print echo	

• Received End-Node SENS300 data

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<pre>send with 'enter' S to End-Node>1 data string = 1,3; End-Node address 0; hex data to send: [0x33][0x3b][0xd][Data to send len = Data transmitted Type M for menu ?>frame tx ok!!</pre>	key - abort with ' x1 0xa][0x0] 0x5; add = 0x1; s	end' key tring = 3;				
Type M for menu 25 frame received len SENS300 data from Temperature=0x4a9b data string in hex [0x33][0x3b][0x4a]]	a = 0xf End-Node 0x1: ; Humidity=0x64fd; ; format: [0x9b][0x64][0xfd]	Ligth=0x8; Du [0x0][0x8][0x0	ummy=0x0 D][0x0][0x0]	[0x1][0xd][0xa][0x(
Type M for menu						
Connected 00.26.22 ANS	SIW 115200 8-N-1	SCROLL CAPS	NUM Capture	Print echo		

Important: All sensors data are transmitted in 32 bit HEX format, without any conversion in ASCII format. Values are position dependent, and must be read scanning the data string received

Note: In the Coordinator Monitor **S** and **3** command will answers a selected End_Node to read and send sensor data. You can see sensor data both in End_Node monitor and Coordinator monitor

• Disable verbose mode ("!" command)

COMx_Rialto - HyperTerminal -						
File Edit View Call Transfer Help						
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******	***		1			
PAN.ID value = 0xcafe Coordinator Module FW 1.00 Verbose mode enabled						
Command format: 'W' + [node id] + [string] 'N' read network status 'c' + [PAN.ID] configure o 'C' + [PAN.ID] configure a 'M' this menu 'I' init system (set devic 'R' system restart 'S' request End-Node ADXL3 '3' request End-Node SENS3 '!' Disable verbose mode 'x or X' spi read test	send data to node Ly Coordinator L network PAN.ID to default Jennet parameter) 2 data) data					
Type M for menu ?>SerizII mode set ver	ose disabled					
?>_						
Connected 00.04.58 ANSIW 1	200 8-N-1 SCROLL CAPS NUM Capture Print echo					

Note: In the Coordinator Serial Monitor, verbose mode is also set by SerizII. With verbose mode disabled, Serial Monitor messages are limited to data string and few other information. Check by yourself this operation mode.

End-Node Serial Monitor

• End-Node main menu

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****************** * Rialto - JNS ************************************	0xcafe 900 1.00 0xcafe 9 FW 1.00 9 data end	****** ooard * *******							
Command format 'W' + [string] 'N' read netwoo 'C' + [PAN.ID] 'M' this menu 'I' init system 'R' system rest 'S' send ADXL36 '3' send SENS30 '!' toggle auto 'Z' to enter si 'x or X' spi rest Type M for menu	send data manually o (set dev: art 2 data 00 data 0 sensor da eep mode ad test	to COORDINA configure de ice PAN.ID : ata send	ATOR evice PAN to defaul	I.ID It Jenne	et pa	rameter)		
Connected 00.00.12	ANSIW	115200 8-N-1	SCROLL	CAPS	NUM	Capture	Print echo		<u> </u>
Connected concorne						1		1.1	

• Coordinator found, End-Node association

COMx_Rialto - HyperTerminal - C	×
File Edit View Call Transfer Help	
<pre>PAN.ID value = 0xcafe End Node Module FW 1.00 Auto send sensor data enabled Command format: 'W' + [string] send data to COORDINATOR 'N' read network status 'C' + [PAN.ID] manually configure device PAN.ID 'M' this menu 'I' init system (set device PAN.ID to default Jennet parameter) 'R' system restart 'S' send ADXL362 data '3' send SENS300 data '!' toggle auto sensor data send 'Z' to enter sleep mode 'x or X' spi read test Type M for menu ?>tart association Node associated id=0x1 Type M for menu ?></pre>	
Connected 00.22.29 ANSIW 115200 8-N-1 SCROLL CAPS NUM Capture Print echo	

• Coordinator lost, End-Node dissociation

COMx_Rialto - HyperTerminal	×
File Edit View Call Transfer Help	
<pre>PAN.ID value = 0xcafe End Node Module FW 1.00 Auto send sensor data disabled Command format: 'W' + [string] send data to COORDINATOR 'N' read network status 'C' + [PAN.ID] manually configure device PAN.ID 'M' this menu 'I' init system (set device PAN.ID to default Jennet parameter) 'R' system restart 'S' send ADXI362 data '3' send SENS300 data '!' toggle auto sensor data send 'Z' to enter sleep mode 'x or X' spi read test Type M for menu ?>End-Node dissociated! Restart Active Scan WAIT! Type M for menu ?>_</pre>	
Connected 00.01.04 ANSIW 115200 8-N-1 SCROLL CAPS NUM Capture Print echo	∨ :

• Set data to send to Coordinator ("W" command)

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PAN.ID value = Oxcafe	
Auto send sensor data disabled	
Command format: 'W' + [string] send data to COORDINATOR 'N' read network status 'C' + [PAN.ID] manually configure device PAN.ID 'M' this menu 'I' init system (set device PAN.ID to default Jennet parameter) 'R' system restart 'S' send ADXI362 data '3' send SENS300 data '1' toggle auto sensor data send 'Z' to enter sleep mode 'x or X' spi read test	
Type M for menu ?> Type the string to send to COORDINATOR send with 'enter' key - abort with 'end' key W.DATA>test	
Connected 00.03.20 ANSIW 115200 8-N-1 SCROLL CAPS NUM Capture Print echo	

- Data sending Blue arrow: string to send Orange circled: hex string format Red circled: End-Node address that send the message Blue circled: Data sending result

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<pre>'R' system restart 'S' send ADXL362 data '3' send SENS300 data '!' toggle auto sensor d 'Z' to enter sleep mode 'x or X' spi read test Type M for menu ?> Type the string to send cond with 'orter' het - W.DATA>test data string = test how data to send. [0x74][0x65][0x73][0x74] Data to send len = 0x7, END-NODE sending Data transmitted Type M for menu ?>_</pre>	ata send to COORDINATOR abort with 'end' key [0x0][0x1] 0xd][0xa][0x0] add = 0x0; string = test	
Connected 00.08.25 ANSIW	115200 8-N-1 SCROLL CAPS NUM Capture Print	echo:

• End-Node network status ("N" command)

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Network status:				
Node.id = 1 - PAN.ID	= 0xcafe - Coordin	ator Address =	0x0	
Tupe M for menu				
?>				
<u></u>				
Connected 01.22.32 ANSIW	115200 8-N-1 SCROLL	CAPS NUM Ca	pture Print echo	

• End-Node ADXL362 data sending (**"S"** command)

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File Edit View Call Transfer He	elp							
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'I' init system (set dev: 'R' system restart 'S' send ADXL362 data '3' send SENS300 data '!' toggle auto sensor da 'Z' to enter sleep mode 'x or X' spi read test	ice PAN.ID ata send	to defau.	lt Jennet	parameter	<u>,</u>)			
Tupe M for monu 2>Sensor read ADXL362 Xaxis=0xffc7; Yax	xis=0xfff7;	Zaxis=0:	x464; Temp	Sensor=0x	c1b8			
<pre>ien = 0xi ADXL362 hex data to send: [0x53][0x3b][0xff][0xc7][0xff][0xf7][0x4][0x64][0x1][0xb8][0x0][0x1][0xd][0xa][0 x0][0x0] END_NODE sending ADXL362 data on air Type M for menu</pre>								
<pre>?>trame tx ok!! Type M for menu ?>_</pre>								
Connected 00.14.06 ANSIW	115200 8-N-1	SCROLL	CAPS NU	A Capture	Print echo			

• End-Node SENS300 data sending (**"3"** command)
	COMx_Rialto - HyperTerminal	×	
File Edit View Call Transfer He	p		
'M' this menu 'I' init system (set devi	e PAN ID to default Jennet para	meter)	
'R' system restart 'S' send ADXL362 data '3' send SENS300 data			
'!' toggle auto sensor data send 'Z' to enter sleep mode 'x or X' spi read test			
Type M for menu ?>Reading S300			
S300 temperature = 0x4a20; hum = 0x83d5; light = 0x9 len Onf SENS300 hex data to send:			
[[Ux33][Ux35][Ux4a][Ux2U][Ux83][Uxd5][UxU][Ux9][UxU][UxU][UxU][Ux1][Uxd][Uxa][UxU][Ox0] FND NODE conding			
SENS300 data on air			
Type M for menu ?>frame tx ok!!			
Type M for menu ?>_			
Connected 00.00.23 ANSIW	115200 8-N-1 SCROLL CAPS NUM Ca	apture Print echo	

• End-Node Auto Send Sensors Data toggle ("!" command)

disable auto send



enable auto send

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• End-Node Sleep Mode ("Z" command)

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File Edit View Call Transfer Help			
しゅ 🖉 🖉 🖫			
Command format: 'W' + [string] send data to 'N' read network status 'C' + [PAN.ID] manually cons 'M' this menu 'I' init system (set device 'R' system restart 'S' send ADXL362 data '3' send SENS300 data '!' toggle auto sensor data 'Z' to enter sleep mode 'x or X' spi read test	COORDINATOR .gure device PAN.ID PAN.ID to default Jennet parameter) send		
Type M for menu ?>sensor data auto send = FALSE Type M for menu ?>entering sleep mode wait Send sleep information to Coordinator END-NODE sending frame tx ok!! Disable serial monitor enter sleep mode!			
Connected 00.14.26 ANSIW 11	00 8-N-1 SCROLL CAPS NUM Capture Print echo		

Important: In End-Node module, configuration command "C" perform only local device PAN.ID settings. If you use this command, End-Node will dissociate himself until it find a Coordinator with same new PAN.ID. The setting sequence is identical to that of the Coordinator command "c"(lowercase)

Tip & Tricks

Stand-alone use of Rialto Boards

"Ready to run" Rialto boards are designed to quick and fast evaluation with PC and SerizII board. You can use the board both connected with PC for stand-alone evaluation or personal purpose. In this case, take care at USB com port installed for each board. For full informations about, see *"Ready to run" Rialto Kit*

Serial channel details

For best developement purpose, you can change serial monitor out:

- USB to serial adapter (TTL out)
- Custom cable to connect 6 pin strip from Rialto Board to USB serial adapter



```
Rialto 6 pin strip schematich

pin 1 --> RxD TTL level

pin 2 --> TxD TTL level

pin 3 --> NC

pin 4 --> GND

pin 5 --> NC

pin 6 --> RESET
```



How to change Serial Monitor out

At the top of Rialto_Coord.c and Rialto_EndD file you can find a variable statement

uint8 vprintf_uart = E_AHI_UART_0;

The Coordinator and End-Node, by default, use USB dongle serial channel (E_AHI_UART_0) for both programming and serial monitor. You can change it to E_AHI_UART_1, and serial monitor will communicate using serial channel connected to 6 pin strip.

Important: Serial channel 1 (E_AHI_UART_1) is default communication channel to SerizII board. When you switch Rialto Serial Monitor out to this channel, all SerizII communication functions will be disabled. The result of this change is the loss of functionality with SerizII

Poll and Sleep settings

In the file **define.h** you can find the Poll and Sleep settings. By defualt, polling is executed every 8 seconds, the number of maximum poll failure is 4. This gives a maximun non-response time equal to 32 seconds: if End-Node will not be found for this timing, Coordinator will disassociate it from Network. End-Node use instead a polling timeout, that is equal ((POLL_TIME * MAX_FAIL)+1) seconds, and by default gives a value of 33 seconds. Then, the time necessary for disassociation will be just over 30 seconds.

The Sleep time is by default 15 seconds: this means that every End-Node in sleep mode will awakes every 15 seconds, sends sensors data and will return in sleep mode. With this setting, the sleep mode has a duration of about 5 minutes. After this time, the device dies. You can change the Sleep Time definition and make it more great to obtain a more long device life.

When in Sleep-mode, if End-Node will not find a valid Coordinator for SLEEP_RETRY times, stops itself with Blue-Led on. By default, this gives End_Node timeout equal to 45 seconds. After this time, End-Node lights up Blue-Led and let it die. You can change number of SLEEP_RETRY in order to have more retry (only during sleep mode)

```
* SLEEP and POLL SETTINGS
// POLL definition --> leave before MAX_SLEEP_FAIL definition
// Coordinator
#define POLL TIME ONE SEC*8
#define MAX_FAIL 4
// End-Node
#define POLL_TIMEOUT (POLL_TIME * MAX_FAIL) +ONE_SEC
//End-Node SLEEP MODE time definition --> seconds - leave before MAX_SLEEP_FAIL.
→definition
#define SLEEP_TIME 15
//Max End-Node sending retry --> only valid in sleep mode
#define SLEEP_RETRY 3
//Coordinator SLEEP MODE fail definition
#if ((SLEEP_TIME*MAX_FAIL) >= ((POLL_TIME/ONE_SEC)*MAX_FAIL))
#define MAX_SLEEP_FAIL ((SLEEP_TIME * MAX_FAIL)/(POLL_TIME/ONE_SEC)+1)
#else
#define MAX_SLEEP_FAIL = MAX_FAIL
#endif
```

Led functions

Rialto board has 2 LEDs, one blue and one red, which indicate the following features

Coordinator

• Blue led, slow lamp -> network scanning active, no devices associated

- Blue led, fast lamp -> network ready, almost one device associated
- Red led -> flashing to indicate radio Rx/Tx

End-Node

- Blue led, slow lamp -> ready to associate, no network or coordinator found
- Blue led, fast lamp -> network ready, device associated (coordinator found)
- Blue led, on -> sleep fail, no coordinator found
- Red led -> flashing to indicate radio Rx/Tx



Firmware debugging

JN5168 modules does't support Jtag emulation. If you need to develope new application, you can use "vPrintf" function.

We also suggest you to see documentation JN516x Wireless Microcontrollers for any specific further detail.

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