Application Note: JN-AN-1061

JenNet Application Template

This Application Note accompanies the software template for JenNet wireless network applications to be run on the JN5148 and JN5139 devices. The JenNet application template uses the Jenie Application Programming Interface (the API for JenNet) and provides a convenient starting point for custom application development.

Application Overview

The JenNet application template provides a basis for your own application development for JenNet networks. It is designed to streamline your application development and to help you rapidly achieve effective JenNet applications. The supplied code includes the necessary Jenie API function calls for setting up the network, and then transmitting and receiving data. You can modify the supplied code to adapt it to your own application needs. Note that the code is relevant to non-beacon enabled networks only.

Supplied Files

Separate code is provided for the network Co-ordinator, Routers and End Devices:

- **AN1061_JN_Coord.c** for the Co-ordinator
- **AN1061_JN_Router.c** for a Router
- **AN1061_JN_EndD.c** for an End Device

For each of the above applications, files are provided for building the binaries:

- Makefiles
- Eclipse project files (**.project** and **.cproject**) for the JN5148 device
- Code::Blocks project files (**.cbp**) for the JN5139 device

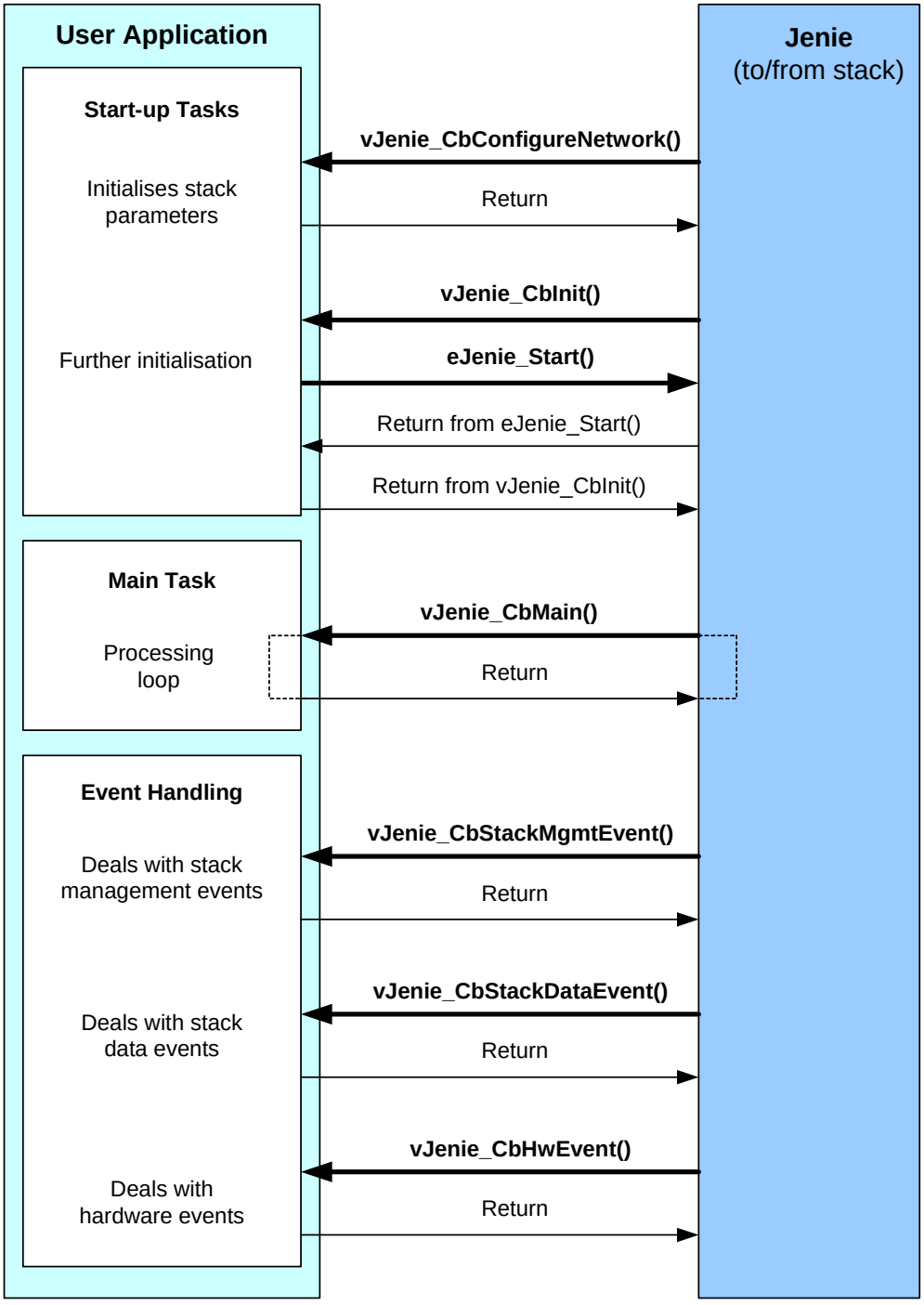
Assumptions

The supplied application templates assume the following:

- The network topology will be a Tree.
- You have one device which will act as the Co-ordinator.
- You have at least one other device (each to act as a Router or an End Device).
- You will use pre-determined values for the PAN ID and Network Application ID.

Application Structure

The structure of each application is illustrated in the diagram below.



The above application structure is described for each node type (Co-ordinator, Router, End Device) in the *JenNet Stack User Guide (JN-UG-3041)*.

Building Your Application

Once you have created your source files (for example, **Coordinator.c**, **Router.c** and **EndDevice.c**), you must build the executables on a PC or workstation before downloading them to the relevant devices. There are two possible methods of building the applications, depending on your development environment:

- Makefiles (for CLI users)
- IDE (Eclipse for JN5148 users, Code::Blocks for JN5139 users)

These are described in the subsections below.

For all build methods, your project directory must be located in:

- **<JN51xx_SDK_ROOT>\Application** for JN5148
- **<JN51xx_SDK_ROOT>\cygwin\jennic\SDK\Application** for JN5139

where **<JN51xx_SDK_ROOT>** is the path into which the JN5148 or JN5139 SDK was installed.

Note that the Jenie library file with which an application is linked depends on the node type, as follows:

- The Co-ordinator and Router applications are both linked to the library file **Jenie_TreeCRLib.a**.
- The End Device application is linked to the library file **Jenie_TreeEDLib.a**.

The relevant library file must be included in the makefile or project file, as appropriate.

Building Code using Makefiles

This section describes how to build your application code using a makefile.

There is a makefile for each node type, located in the **Build** sub-directory for the corresponding application. For example, the Co-ordinator makefiles are located in:

...\JN-AN-1061-Jenie-Application-Template\AN1061_JN_Coord\Build

Different makefiles are provided for JN5148 and JN5139 - a JN5148 makefile is simply called **Makefile** and a JN5139 makefile is called **Makefile_JN5139.mk**.

To build your code, navigate to the **Build** directory for the application and follow the instructions below for your chip type:

For JN5148:

At the command prompt, enter:

```
make clean all
```

For JN5139:

At the command prompt, enter:

```
make -f Makefile_JN5139.mk clean all
```

Note that for the JN5148 device, you can alternatively enter the command from the top level of the project directory, which will build the binaries for all applications.

In all the above cases, the binary file will be created in the relevant **Build** directory, the resulting filename indicating both the chip type (**JN5148** or **JN5139**) and networking stack (**JN** for JenNet) for which the application was built.

Building Code using Eclipse (JN5148 Only)

This section provides information on building application code for the JN5148 device using the Eclipse IDE. You must use the version of Eclipse provided by Jennic. This is described in the *Eclipse IDE User Guide (JN-UG-3063)*.

The build process in Eclipse uses the following files:

- A makefile for each application
- Eclipse project files (**.project** and **.cproject**), where each file covers all the applications in the project

The project files are located in the top level of the project directory (**JN-AN-1061-JenNet-Application-Template**). The makefile for an application is simply called **Makefile** and is located in the application's **Build** sub-directory - for example, for the Co-ordinator:

...\JN-AN-1061-JenNet-Application-Template\AN1061_JN_Coord\Build

For further instructions on creating and building a project in Eclipse, refer to the *Eclipse IDE User Guide (JN-UG-3063)*.

Building Code using Code::Blocks (JN5139 Only)

This section describes how to build application code for the JN5139 device using the Code::Blocks IDE.

> **!** ***Caution:*** *You must use the version of Code::Blocks provided by Jennic. This version is described in the Code::Blocks IDE User Guide (JN-UG-3028).*

You will need a Code::Blocks project file for each source file - for example, **5139_JN_Coord.cbp**, **5139_JN_Router.cbp** and **5139_JN_EndD.cbp**. Here, the prefix indicates the target chip.

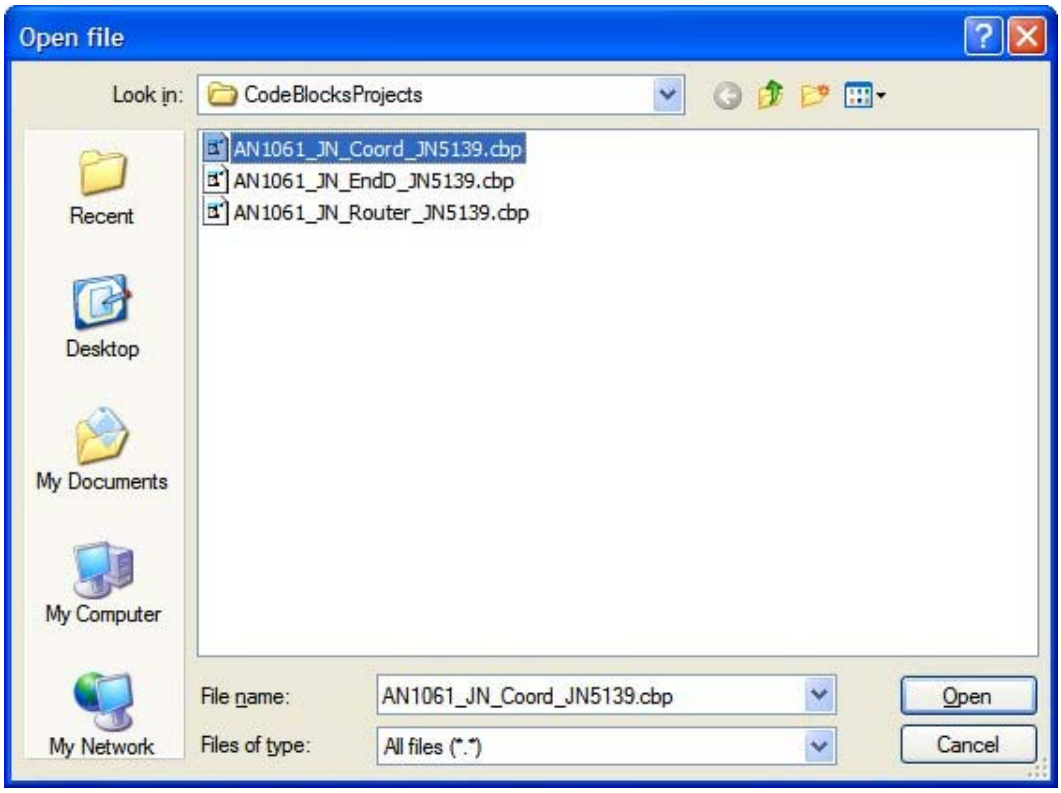
You can base your project files on the examples supplied with this Application Note. The Code::Blocks project files are located in the directory:

...\JN-AN-1061-JenNet-Application-Template\CodeBlocksProject

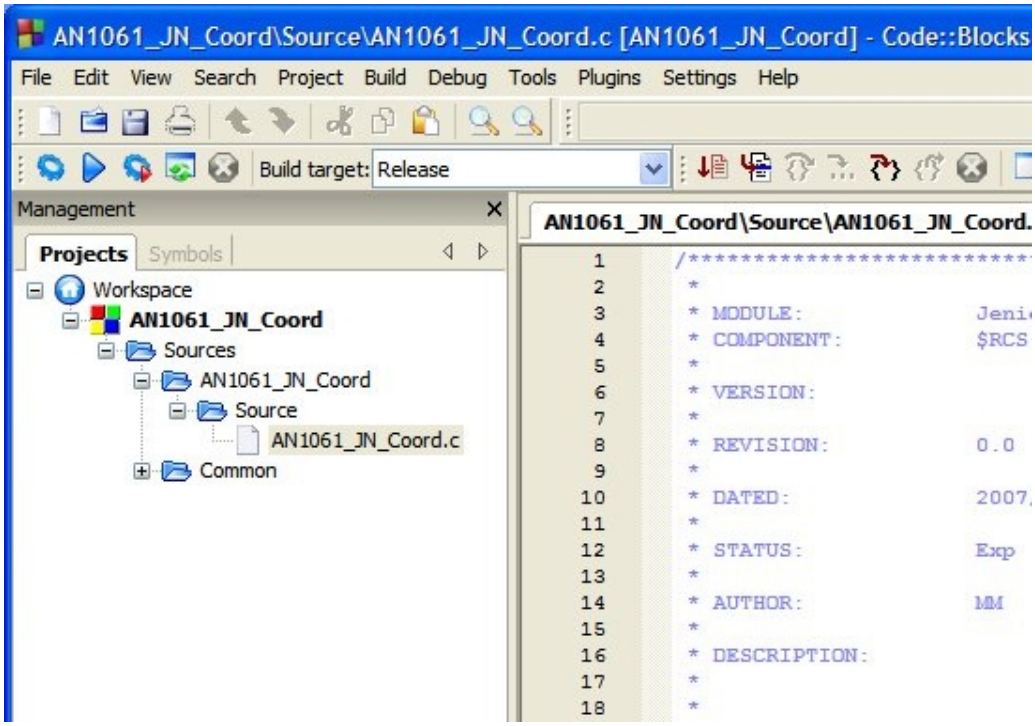
A project file is provided for each node type (Co-ordinator, Router, End Device).

Follow the procedure below (you will need to do this for each application).

1. Start Code::Blocks and open the project to be built by following the menu path **File > Open**.
2. In the **Open file** screen, choose the project file for the application to be built (e.g. **5139_JN_Coord.cbp**).



3. To display the source code, navigate to the required source file under the **Projects** tab of the left pane and double-click on the filename.



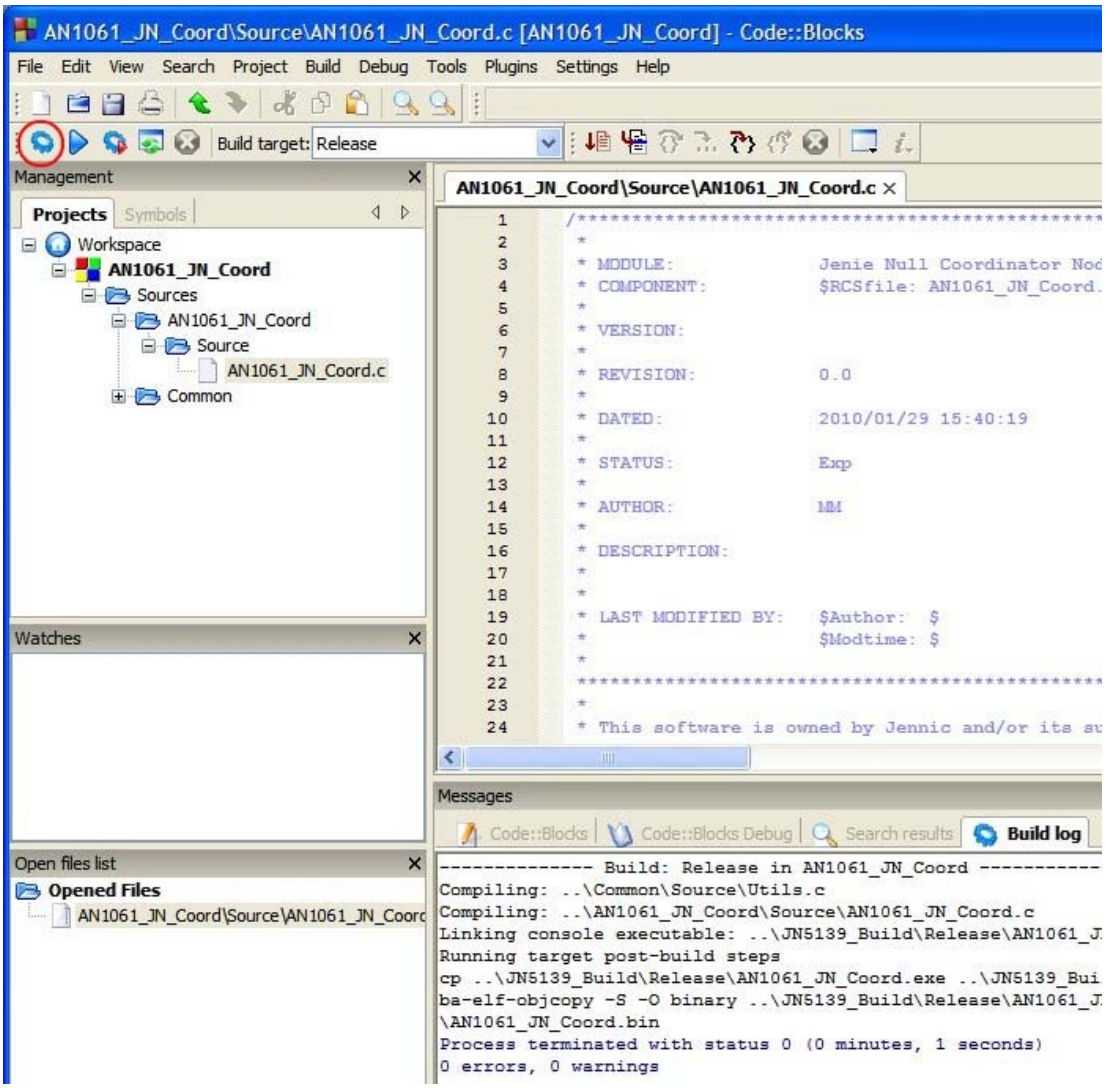
4. Select the required build type, Debug or Release, by following the menu path **Build>Select target**.

   - If you are building for debug purposes, select Debug.
   - If you are building for a final release, select Release.

   Alternatively, you can make this choice using the **Build target** drop-down list in the Code::Blocks toolbar.

   Note that code built with the Debug setting will only run in debug mode on the local PC (and will not run on the JN5139 device).

5. To compile the application, click on the **Build** button (circled in red below) in the toolbar of Code::Blocks. To see the build log, click on the **Build log** tab in the bottom pane of the Code::Blocks window.



Note that compile and link errors (if any) are displayed in the **Build log** pane.

Downloading Code to Nodes

Once you have built your application for the JN5148/JN5139 device, there are two possible ways of downloading your binary file to the target device:

- If you are using the Code::Blocks IDE or Eclipse IDE provided by Jennic, you can download your **.bin** file directly from the IDE - refer to the *Code::Blocks IDE User Guide (JN-UG-3028)* or *Eclipse IDE User Guide (JN-UG-3063)*, as appropriate.
- Otherwise, you must run the JN51xx Flash Programmer to download your **.bin** file - refer to the *JN51xx Flash Programmer Application User Guide (JN-UG-3007)*.

Related Documents

The following documents will prove useful when using the template to develop your own JenNet applications:

JN-UG-3041 JenNet Stack User Guide

JN-AN-1085 JenNet Tutorial Application Note

Compatibility

The software provided with this Application Note has been tested with the following evaluation kits and SDK versions:

Product Type	Part Number	Version	Supported Chips
Evaluation Kit	JN5139-EK000	-	JN5139
	JN5139-EK010	-	JN5139
	JN5148-EK010	-	JN5148
SDK Libraries	JN-SW-4030	v1.5	JN5139
	JN-SW-4040	v1.3	JN5148
SDK Toolchain	JN-SW-4031	v1.1	JN5139
	JN-SW-4041	v1.0	JN5148

Revision History

Version	Notes
1.0	First release
1.1	Updated for JN5139 and new SDK
1.2	Updated for Jenie/JenNet v1.3
2.0	Support for JN5148 added
3.0	Template details migrated from former Jenie API User Guide (JN-UG-3042) to Application Note

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