

CC-6LOWPAN-DK-868 Quick Start Guide

STEP 1 – Introduction

This guide describes how to set up a CC-6LOWPAN-DK-868 development kit using the pre-programmed devices of the CC-6LOWPAN-DK-868 Kit.

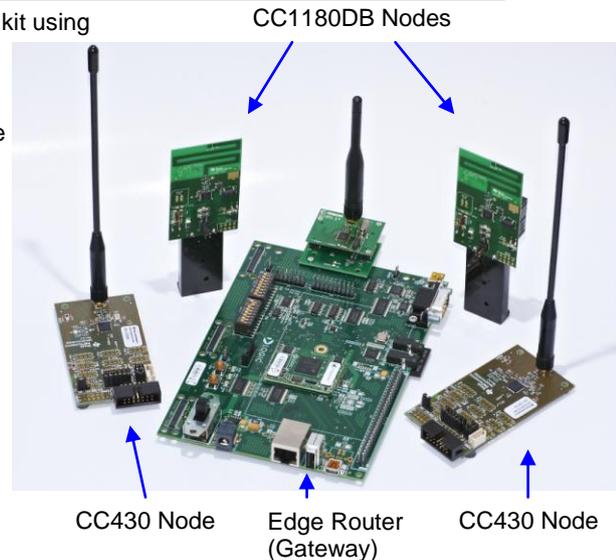
The 6LoWPAN development kit is designed to give a simple introduction to 6LoWPAN wireless networks in the 868/915MHz bands. The hardware consists of an OMAP-L138 based Edge Router equipped with a CC1180EM, 2 CC430F5137 based nodes and 2 CC1180DB nodes.

The CC1180DB boards consist of a network processor (CC1180) pre-programmed with a 6LoWPAN software stack, and a MSP430F5438A microcontroller that controls the 6LoWPAN device.

The CC430 based nodes consists of a CC430F5137 SoC (RF+MCU) that runs both the 6LoWPAN software stack and the controlling application.

The Edge Router board is running Linux and is pre-programmed with Sensinode Nanorouter 2.0 software, which acts as a bridge between IPv6 and 6LoWPAN. The Edge Router is connected to a PC via Ethernet. The Edge Router sets up the network and configures the 6LoWPAN network parameters.

The development kit demonstrates an example of a typical sensor network with a simple Network Analyzer software running on the nodes. The nodes are automatically given a unique IPv6 address and can be pinged from a PC using standard tools. Each node in the 6LoWPAN network also has a unique preprogrammed IEEE address. The battery powered nodes can act as routers that on request report their key data to the Edge Router.



STEP 2 – Install the PC software and connect the Edge Router

Install the Windows IPv6 stack on a Windows XP PC. The IPv6 installation is not needed in Linux and Windows 7, since IPv6 is already installed.

Open a command prompt and write `ipv6 install`

Assign the IPv6 address 2001::22 to the PC using the command prompt: (Run in administrator mode in Windows 7)
`netsh interface ipv6 add address "Local Area Connection" 2001::22`

Set up a default route using the command prompt: (Run in administrator mode in Windows 7)
`netsh interface ipv6 add route ::/0 "Local Area Connection"`

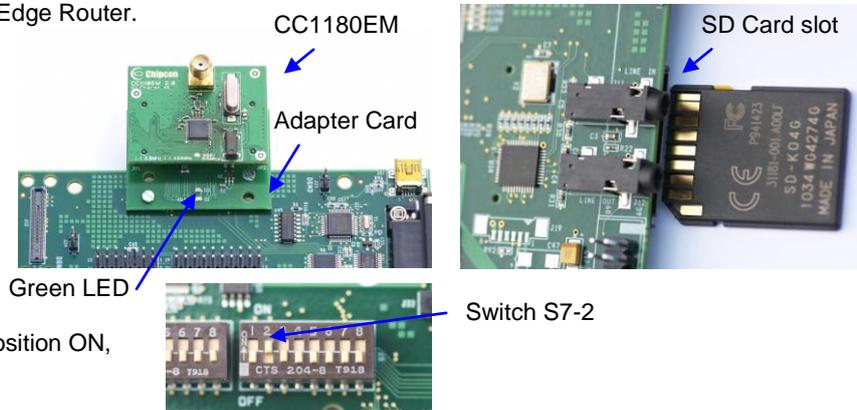
Note! You must change "Local Area Connection" to the actual name of the Ethernet connection you want to use. You can get it from **Windows Network Connections**. The IPv6 address 2001::22 has to be unique on your network.

Plug in the power cable to the Edge Router and connect the Ethernet cable between the Edge Router and the PC. Make sure that the Edge Router is **not** powered on.

Insert the SD card into the slot on the Edge Router.

Connect the CC1180EM to the adapter card and connect an antenna to the CC1180EM.

Connect the adapter card to the J30 connector on the Edge Router. The adapter card can be fastened to the Edge Router by the provided M2 screws.



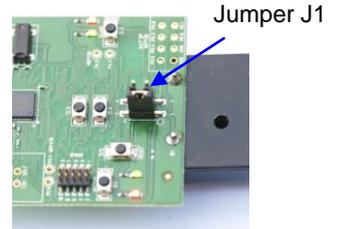
Make sure that the switch S7-2 is in position ON, and all other in position OFF.

Power on the Edge Router using the S4 switch.

It will take approximately 40 seconds to boot the Edge Router. When the green LED on the Adapter Card goes ON it indicates that the Edge Router is up and running. You can connect the provided RS-232 NULL modem cable between the Edge Router and PC to get debug information, use e.g. Windows HyperTerminal with settings; Baud Rate 115200, 8 Data Bits, No Parity, One Stop Bit and No Flow Control.

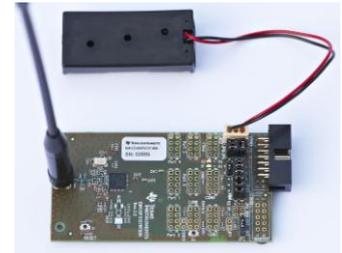
STEP 3 – Connecting the nodes to the 6LoWPAN network

Insert batteries in one or more of the CC1180DB boards and make sure the jumper is connected between P1-1 and P1-2 to power on the node. It will automatically connect to existing network. LEDs D1 and D2 are controlled from the CC1180 network processor and gives status on node connection. When the CC1180DB node is connected to the network the green LED (D2) will be on, if not connected it will be off. The red LED (D1) blink when node is communicating. LEDs D3 and D4 are controlled from the host MCU and displays the RSSI value. Both LEDs off: RSSI above -40dBm, green LED on red LED off: RSSI between -40 and -65dBm, both LEDs on: RSSI between -65 and -90dBm, green LED off red LED on: RSSI below -90dBm. The red LED toggles with 1 sec interval if 3 concurrent reply messages were missed or Analyzer is not activated on PC.



Insert batteries in one or more of the CC430F5137 battery packs and connect an antenna. Connect the battery pack cable to power on the node.

LEDs D1 and D2 are controlled from the 6LoWPAN stack in CC430 and gives status on node connection. When the CC430 node is connected to the network the green LED (D1) will be on. The red LED (D2) blink when node is communicating.



When nodes are powered on they connect automatically to the 6LoWPAN network, either directly to the Edge Router or via other nodes (Routers) in the network. Upon request from the Edge Router they send messages including network information to the Edge Router.

STEP 4 – Installing and Using NodeView Network Analyzer software

Node View can be used to interact with the nodes in the network. It has several powerful features such as Network Analyzer, message logs, running demo applications and to send custom data to nodes.

Download and install the latest Java runtime engine from www.java.com to your Windows PC.

Minimum version of Java to run NodeView is 1.6.0

Extract the provided NodeView package to C:\NodeView
NodeView package can be found via link on www.ti.com

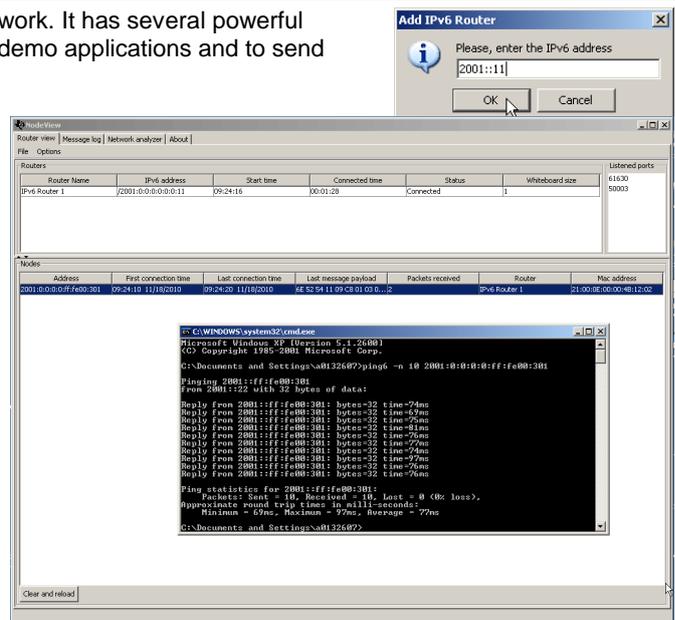
Start NodeView by double-clicking the extracted NodeViewProDyn.jar file in C:\NodeView

Connect to your Edge Router by selecting File -> Add NanoRouter IPv6 in the RouterView tab.

Enter the IPv6 address of the Edge Router which is 2001::11

The connected Edge Router is then shown in the Routers field.

The connected nodes are shown in the Nodes field. You can now use standard network tools to communicate with the nodes. To ping a node right-click a node and copy the IPv6 address of the node. Open a command prompt on your Windows XP PC and write: ping6 -n 10 [IPv6 address] Replace [IPv6 address] with the copied IPv6 address of the node you want to ping. This example will ping the node 10 times. Use the ping command on Linux and Windows 7. You can also view the network topology in the NodeView tab Network analyzer.



STEP 5 – Next steps and more Information

Extensive examples are provided to help you get started. Building and running each example is recommended to become acquainted with the devices. Refer to the examples' wiki page for more information.

For detailed information about the sample applications please see the following resources:

- CC-6LOWPAN-DK-868 wiki page: <http://processors.wiki.ti.com/index.php/CC-6LoWPAN>
- CC-6LOWPAN-DK-868 product web page: <http://www.ti.com/6lowpan>
- The Low Power RF Online Community has forums, blogs and videos. Use the forums to find information, discuss and get help with your design. Join us at www.ti.com/lprf-forum

Important note: The CC-6LOWPAN-DK-868 kit is an educational tool that allows developers to get familiar with basic 6LoWPAN networks. It is **not** intended as a 6LoWPAN reference design.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Mobile Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Transportation and Automotive	www.ti.com/automotive
Video and Imaging	www.ti.com/video

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2011, Texas Instruments Incorporated