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iDigi[®] Gateway Development Kit Getting Started Guide

Wireless WAN Version

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Using this Guide

Contact Information

Please always check the product specific section on the Digi support website for the most current revision of this document: http://www.digi.com/gatewaydevelopmentkit.

For more information about your Digi products, or for customer service and technical support, contact Digi International.

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Conventions used in this Guide



This icon indicates a step that has the potential to be troublesome. Further information regarding items marked with this symbol can be found in Appendix D: Troubleshooting on page 79.

This icon indicates a hint, or concept that is learned.



This icon indicates that a goal of the kit has been completed.



This icon indicates a warning of the potential for confusion or danger.

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Introduction to the iDigi[®] Gateway Development Kit – Wireless WAN Version

Thank you for purchasing an iDigi Gateway Development Kit. The kit is designed to make it easy to setup an XBee network, upload a custom iDigi Dia application, and provide seamless connectivity to the iDigi Cloud for web services integration to standard business applications over the Internet. Before you start working with the kit, let's cover some basics.

Goals of the Kit

As you go through the steps in this kit, you will:

- 1. Configure the Wireless WAN interface of the ConnectPort X4.
- 2. Create an iDigi developer account on the iDigi M2M operating Cloud.
- 3. Setup and configure the physical elements of an XBee wireless network and understand how the network is managed through a ConnectPort X4 gateway.
- 4. Use the Digi ESP for Python IDE to build, download, and launch an iDigi Dia application for your ConnectPort X4 gateway, then interact with the application in a realistic setting.
- 5. Use the iDigi Manager Pro Web Services Console to send a web service request to the ConnectPort X4 retrieving the current XBee devices' sensor readings.
- 6. Use the iDigi Gateway Development Kit Demonstration Application to understand how an Enterprise application could use the iDigi Web Services API to monitor the data gathered by the XBee devices' sensors.

Requirements of the Kit

System Requirements

To install the software mentioned in the Getting Started Guide, you will need a PC running Microsoft Windows XP, Vista or Windows 7.

Web Browser Requirements

Microsoft Internet Explorer 7.0 or newer Google Chrome 4.0 or newer Mozilla Firefox 3.0 or newer

Additional Requirements

This Getting Start Guide assumes a scenario where there are no other XBee wireless devices in the area (other than the ones provided with this kit) and that the local network has an Internet connection.



Note: If other XBee networks are present and open for joining, the XBee Sensor and XBee Smart Plug may join the wrong network. Please refer to the "XBee devices fail to join the ConnectPort X4's network" section of Appendix D: Troubleshooting on page 79 for more information.



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Part 1: Setup your Digi[®] Gateway Development Kit

Step 1: Kit Preparation

Identify Your Kit Components

Carefully unpack and verify the contents of your kit.



Figure 1: Kit Components

The table below indicates the type and quantity of cellular or WiMAX antennas included in your kit.

Antenna	Sprint X4K-Z1U-C1011-A1	Verizon X4K-Z1U-C2011-A1	AT&T X4K-Z1U-H2011-A1	Generic X4K-Z1U-U7011-A1	WiMAX X4K-Z1U-C6011-A1
Α	1	1	1	1	1
В	2	2			
С			2	2	
D					2

Step 2: Unpack and Set up the ConnectPort X4

To begin setting up your iDigi Gateway Development Kit, you will need to connect the antennas to your ConnectPort X4, connect your PC's Ethernet cable to the ConnectPort X4, and then power on the ConnectPort X4, and then form your XBee network.



Figure 2: Connecting Hardware

- 1. Remove the ConnectPort X4 from the box and attach the XBee antenna to the unit.
- 2. Attach the Cellular or WiMAX antenna(s) to your ConnectPort X4.
- 3. Connect the power supply to the ConnectPort X4 and then plug the power supply into a wall outlet.

Note: The power supply has a twist-locking connector, ensure that the connector is locked into place.

Step 3: Configure the ConnectPortX4

Note: By default, ConnectPort X4 Wireless WAN models are configured with a static IP Address of 192.168.1.1 for the Ethernet interface, and they are configured to act as a DHCP Server. This configuration simplifies the initial configuration of the unit.

- 1. Connect one end of the Ethernet cable to your PC, and the other end to the ConnectPort X4 Ethernet port (ensure that your PC is configured to obtain its IP address via DHCP).
- 2. Open the Web interface of the ConnectPort X4 by navigating to the 192.168.1.1 address in a Web browser on the PC and you will see a screen similar to the following:

902 · C X 🔬 🗋	http://192.168.1.1/home.htm	٤	🖇 🔹 🚰 🕯 Google
ConnectPort X4 Configuration and	IM		
Digit	ConnectPort X	4 Configuration and Man	agement
tome			O He
in the second law	Home		
Network	Getting Started		
Mobile XBee Network	Tutorial Not sure wh	at to do next? This Tutorial can help.	
Serial Ports	System Summary		
Camera	Model	CoppectPort X4	
Alarms	Ethernot MAC Address:	00:40:90:4F:05:F2	
iDigi			
Users	Ethernet IP Address:	192.168.1.1	
Position	Mobile IP Address:	Not Connected	
onlications	1.0021.00010.0004688915		
Python	Description:	None	
RealPort	Contact:	None	
Industrial Automation	Location:	None	
danagement			
Serial Ports	Device ID:	0000000-0000000-00409DFF-FF4FDSE2	
Connections			
Event Logging Network Services			
Administration			
File Management			
X.509 Certificate/Key			
Management Backup (Postorn			
Update Firmware			
Factory Default Settings			
System Information			
Reboot			
ogout			
	Copyright @ 1996-201	1 Digi International Inc. All rights reserved.	

3. Configure the ConnectPort X4 Wireless WAN and Ethernet interface. Select the Appendix below that best matches the Wireless WAN interface of your ConnectPort X4.

Note: For more information on how to properly configure the ConnectPort X4 Wireless WAN interface, refer to the following Appendix:

Appendix A: Configuring for a GSM/Edge cellular network (AT&T) Appendix B: Configuring for a CDMA cellular network (Verizon) Appendix C: Configuring for a CDMA cellular network (Sprint) Appendix D: Configuring for a WiMAX network Once you have followed the configuration examples for the Wireless WAN interface in the appropriate Appendix, continue with the following sections below:

Configuring the ConnectPort X4 IP Gateway Priority

Once the ConnectPort X4's mobile interface is connected, it could conceivably reach the Internet via either of its network interfaces (Mobile or Ethernet). Configuring the ConnectPort X4 Gateway Priority List determines the priority for each of its network interfaces. By default the ConnectPort X4 gives the Mobile interface the highest priority.

The ConnectPort X4 IP Gateway Priority List and the DNS Priority List are configurable via the Configuration > Network > Advanced Network Settings page, as displayed below: (Gateway Priority will display WiMAX for WiMAX units.)

 Advanced Network Se 	ttings
The following settings ar interfaces. The default se	e advanced settings used to fine tune the network connection and network ettings will typically work in most situations.
IP Settings	
Host Name:	
Static Primary DNS:	0.0.0.0
Static Secondary DNS:	0.0.0.0
DNS Priority:	Static Mobile Ethernet
Gateway Priority:	Mobile Contraction
See also IP Network Fail	over Settings for default gateway management.
DNS Proxy Settings	
Enable DNS Proxy Sector	ervice
Request Cache	Size Maximum: 256 entries (16-1024)
	Figure 4: Advanced Network Settings

Configuring the Ethernet Interface

Now that the ConnectPort X4's mobile interface is configured, you will need to configure the Ethernet interface. The Ethernet configuration changes will involve disabling the DHCP Server and determining how the ConnectPort X4 will be given its IP address.

1. Click on Configuration > Network from the left-hand menu. You should see the Network Configuration screen (with the Ethernet IP Settings page displayed by default) as shown:

Digit	ConnectPort X4 Configuration a	nd Management
		😗 Help
Home	Network Configuration	
Configuration Network	▼ Ethernet IP Settings	
Mobile XBee Network	O Obtain an IP address automatically using DHCP *	
Serial Ports Camera	Ose the following IP address:	
Alarms	* IP Address: 192.168.1.1	
System	* Subnet Mask: 255.255.255.0	
iDigi Users	Default Gateway: 0.0.0.0	
Position		
Applications Python RealPort Industrial Automation	* Changes to DHCP, IP address, and Subnet Mask may at Apply	fect your browser connection.
Serial Ports	DHCP Server Settings	
Connections Event Logging	Network Services Settings	
Network Services	Dynamic DNS Update Settings	
Administration	▶ IP Filtering Settings	
File Management	▶ IP Forwarding Settings	
Management	▶ IP Network Failover Settings	
Backup/Restore Update Firmware	Socket Tunnel Settings	
Factory Default Settings	Virtual Private Network (VPN) Settings	
System Information Reboot	▶ IP Pass-through Settings	
Lessut	▶ Host List Settings	
τομού	Virtual Router Redundancy Protocol (VRRP) Settings	
	Advanced Network Settings	

Figure 5: Ethernet IP Settings

- 2. Click the DHCP Server Settings link and open the DHCP Server Settings page.
- 3. To disable the DHCP Server, un-check the "Enable Dynamic Host Configuration Protocol (DHCP) Server" entry. Click Apply when finished.
- 4. Return to the Ethernet IP Settings page by clicking the Ethernet IP Settings link.
- 5. Configure the ConnectPort X4 with either a static IP address, or have it get its IP address from a DHCP Server, whichever method is appropriate. Click Apply when finished.

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Viewing IP Address Information

The ConnectPort X4 Home page will display the IP address for both the Ethernet and Mobile networks.

Digi	ConnectPort X	4 Configuration and Management	
Home	llome		😮 Help
Configuration	nome		
Network	Getting Started		
Mobile	Tutorial Not sure wh	at to do next? This Tutorial can help.	
XBee Network	intervence in		
Serial Ports	System Summary		
Camera	-,,		
Alarms	Model:	ConnectPort X4	
System	Ethernet MAC Address:	00:40:9D:50:12:1A	
iDigi			
Users	Ethernet IP Address:	10.21.6.124	
Position	Mobile IP Address:	68.26.179.6	
Applications			
Python	Description:	None	
RealPort	Contact:	None	
Industrial Automation	Location:	None	
Management			
Serial Ports	Device ID:	0000000-0000000-00409DFF-FF50121A	
Connections			
Event Logging			
Network Services			
Administration			
File Management			
X.509 Certificate/Key			
Management			
Backup/Restore			
Update Firmware			
Factory Default Settings			
System Information			
Rebuut			
Logout			

Figure 6: ConnectPort X4 Home Page

Viewing Ethernet Statistics

To view information about the Ethernet Link as well as Ethernet and IP statistics, navigate to the Administration > System Information > Network page.

The ConnectPort X4 is now ready to be moved to your Ethernet network, and by default will use its mobile interface as its primary network interface.

Disconnect the ConnectPort X4 from your PC and then connect it to the Ethernet network (if the PC needs to be reconfigured with a static IP address, do this prior to moving the PC to the Ethernet network as well).



You have just completed Goal #1: Configure the Wireless WAN interface of the ConnectPort X4.

Step 4: Setup the XBee Smart Plug and XBee Sensor



XBee/ZigBee Note: If you have additional XBee/ZigBee devices, for the best kit experience, we recommend powering down or disable joining other XBee/ZigBee PANs in the area before beginning this step. If you are unable to do this other devices might join the kit network and create interference when deploying your iDigi Dia project. You could also encounter issues connecting the XBee Sensor and XBee Smart Plug to the ConnectPort X4 as they are configured to join any available PAN.

- 1. Remove the XBee Smart Plug from the box and plug it into a wall outlet. The green LED will blink to indicate that the XBee Smart Plug is associated with an XBee network.
- Remove the XBee Sensor from the box and insert the batteries (3) from the box and install them into the XBee Sensor (unscrew the two screws on the XBee Sensor to install the batteries). The XBee Sensor's ASSC LED will blink when the device is connected to your XBee network.



Note: If either of the XBee devices fails to blink its ASSC LED indicating that it is connected to your XBee network, please refer to the "Is the ASSC LED solid green?" section of Appendix D: Troubleshooting on page 79 for more information.

Step 5: Connect the ConnectPort[®] X4 to iDigi[®]

The iDigi Cloud is an on-demand hosted service platform with no infrastructure requirements for the user. The iDigi Cloud provides device management, iDigi client application to iDigi device data interaction (messaging), and data storage for a network comprised of both wired and wireless Digi and third-party Gateways (called iDigi devices). The iDigi Cloud provides easy integration with M2M and mesh network devices.

First, before you can connect your ConnectPort X4 to iDigi, you must create an iDigi developer account.

- 1. To set up an iDigi developer account:
 - a. Navigate to <u>http://www.idigi.com</u>.

Login

b. Click the **iDigi Login** button in the upper right corner of the page.

c. Click the iDigi Developer Cloud login button.



Figure 7: iDigi Cloud Screen

You will be redirected to the iDigi Developer Cloud login page.



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d. If you do not already have an iDigi developer account, click on the "Are you a new user" link and create your account.

If you already have an account, login and skip ahead to the "Add the ConnectPort X4 to your iDigi inventory" section on the next page.

Digi [•] Developer Cloud			
	Log in to iDigi	\frown	
User Name:		Are you a new user?	
Password:			
	Login 🖸		
Eoroot your user.	name or password?		

Figure 8: iDigi Login Page

Continue filling in all required fields of the iDigi Registration Form until you complete the iDigi Registration process.

First Name: Last Name: Email:	* *	City:				
Last Name: Email:	*	City:	r			
Email:						
and the second se		State:]]	
Job Title:		Postal Code:				
Phone:		Country:	United States	-		
	-1	Country.	United States		1	
Asterisk indicates required field.						
					- Baller	

Figure 9: New User Registration Page

e. After completing the iDigi Registration process, you will be redirected to the iDigi Login page (refer to Figure 5, above). Enter your iDigi user credentials and then click the **Login** button.



You have just completed Goal #2: Creating an iDigi developer account on the iDigi M2M operating platform.

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Add the ConnectPort X4® to your iDigi® Inventory

The iDigi Cloud allows you to securely manage the devices in your device inventory.

- 1. To add the ConnectPort X4 to your inventory, follow these steps:
 - a. Select the **Devices** link in the Left Navigation Bar.
 - b. Click the **Add Devices** button in the Tool Bar to open the Add Devices applet. The Add Devices applet will discover the Digi devices on your network.



Note: In order to discover devices on your network automatically, the Add Devices applet requires Java Runtime Environment (JRE) 1.6 or newer.



If Java Runtime Environment (JRE) 1.6 is not installed, you must add your device manually; see the "iDigi Manager Pro does not discover your ConnectPort X4" section of Appendix D: Troubleshooting, on page 80 for more information.

c. Select your ConnectPort X4 from the list. To verify that you are selecting the correct device from the list, match the MAC address listed on your label (found on the bottom of the device) with the MAC address listed within the Add Devices applet. Click the **OK** button.

9Digi			iDigi l	Manager Pro			idigi	<u>About Log Off</u> _test, iDigi Evaluation
🟠 Home	Devices							
Welcome Resources		K (T = - 4	0					
	Search:		S × ≷				227.	
Sanina Sanin	MAC Address	00409dEE-EE49b0bf	10.21.6.178	ConnectPort X4	Gatemay Dev Kit I)emo	Connected	2 12 0 6
XBee Networks Storage Web Services Console	Add Devic	es				0		
Subscriptions Summary Details	Below are your devic	e the devices found on ce is not found, click the	your local networ Add Manually b	k. Select the ones yo utton.	ou would like to add	and click OK . If		
(3) Administration	Atter	npt to auto-configure s	elected discovere	ed devices to conner	ct to iDigi.			
My Account Messages Operations	My Account Warning: This action may reboot the device. Messages Operations Select Devices: All None. (1 devices found)							
	MAC Add	ress IP Address	Hardware Nam	e Dev	rice Id	🛷 Refresh		
			Dia No d OK	In't find your device (evices to add Cancel	on the network?	dd Manually >>		
Peady								1 douicou
neauy								I device:

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d. Wait about 60 seconds then go back to the Devices list and click the **Refresh** button. The status of your ConnectPort X4 should now appear as "Connected."

[©]Dıgı⁻			iDigi	Manager Pro		idigi_	<u>About Log Off</u> _test, iDigi Evaluation
🔂 Home	Devices						
Welcome Resources							
	Search:		Q x ¥			(
Management	MAC Address	Device ID	IP Address	Device Type	Description	Status	Firmware Level
Devices	🗇 00409D:49808F	00409dFF-FF49b0bf	10.21.6.178	ConnectPort X4	Gateway Dev Kit Demo	Connected	2.12.0.6
Storage Web Services Console							
Subscriptions							
Summary Details							
Administration							
My Account Messages Operations							
Ready							1 device

Figure 11: iDigi Device Inventory



Note: If the device still appears as 'Disconnected' after clicking the Refresh button, please refer to the "iDigi Manager Pro lists the ConnectPort X4 as 'Disconnected'" section of Appendix D: Troubleshooting, on page 82 for more information.

Step 6: Install the Digi ESP™ for Python Development Environment

The Digi ESP for Python Development Environment is an Eclipse-based Integrated Development Environment (IDE) that simplifies the process of creating Python applications for iDigi devices. It also provides many example projects, one of which we will be using later in this section.

To download and install the Digi ESP for Python Development Environment:

- Navigate to <u>http://www.digi.com/gatewaydevelopmentki</u>t and click on the "Download Digi ESP for Python" link.
- You will be redirected to the Python Product page. The various download options for the Digi ESP for Python framework will be displayed on this page. Click on the "Digi ESP for Python - Windows XP/Vista/Windows 7 installer ver. 1.2.0.5" link to download the Digi ESP for Python Development Environment.



Figure 12: Select Digi ESP for Python Download Variant

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- Once the Digi ESP for Python framework has been downloaded, run the Digi ESP for Python framework installation wizard. Follow the steps in the wizard to complete the installation process. Click **Finish** at the end of the installation.
 Note: A prompt will ask you if you would like to open the Release Notes associated with the Digi ESP for Python framework, deselect this checkbox.
- 4. The Digi ESP for Python framework will launch automatically and prompt you to select a workspace directory. Use the default workspace directory (or click the **Browse** button and navigate to your desired alternate workspace location), check the "Use this as the default and do not ask again" box, and click **OK**.



Note: The Digi ESP for Python framework 'workspace' is the directory where projects and configurations will be stored. The default location for this directory is a subfolder called **workspace** on the user home directory, for example, **C:/Documents and Settings/[username]/workspace**.

🐵 Workspace Launcher 🛛 🔀				
Select a workspace				
Digi ESP for Python stores your projects in a folder called a workspace. Choose a workspace folder to use for this session.				
Workspace:	C:\Documents and Settings\jlee2\workspace	Browse		
☑ Use this a	s the default and do not ask again	OK Cancel		

Figure 13: Selecting your Digi ESP for Python Workspace

5. The first time you run Digi ESP for Python the **Welcome** screen is displayed.



Figure 14: Digi ESP for Python Welcome Screen

6. Open the Digi ESP for Python Workbench by clicking on the Workbench icon (as indicated above).



Figure 15: Digi ESP for Python Workbench

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Step 7: Create your first iDigi® Dia Project

The iDigi Dia (Device Integration Application) is software written in Python that simplifies the task of gathering data from attached devices (such as XBee Sensors), and sending the gathered data to iDigi, allowing for easy integration with client applications using the iDigi Web Services API to access it.

The steps in this section will help you build, download, and launch your first iDigi Dia application.

The resulting iDigi Dia application will contain drivers for the XBee Sensor and XBee Smart Plug. The application will also be configured to report its data using the RCI presentation for access with iDigi Web Services (which will be demonstrated later in this guide).

To begin creating your first iDigi Dia project:

 Open the iDigi Dia Project Wizard by clicking File > New > iDigi Dia Project from the File menu.

New	Alt+Shift+N	🚪 🗁 Digi Python Application Project
Open File		Digi Python Application Sample Project
Close	Ctrl+W	📸 iDigi Dia Sample Project
Close All	Ctrl+Shift+W	🚠 iDigi Dia Project
1 Save	Ctrl+S	Project

Figure 16: Selecting an iDigi Dia Sample Project

 The main wizard page contains a text box to insert the name of the project to be created; name your project. This example uses a project name of "Demo_Project1" but you can choose any unique name. Once the project name has been provided, click Next.

roject name: Demo_Project1	
Use default location	
cation: C(\ESP\Documents and	Settings\Admin\workspace\Demo_Project1 Browse.
Digi Dia settings	
🕑 Use default iDigi Dia version	
Select an IDigi Dia version	1.3.8
🔿 iDigi Dia Path:	Browse
Advanced project settings	
Use default configuration file	name
File name: dia	,yml
Include iDigi Dia source code i	in project

Figure 17: Name your iDigi Dia Project

3. Within the Remote Device selection wizard page ensure that **Use Current Remote Configuration** is selected, and then click the **New...** button to create a new remote configuration.

) iDigi Dia Project Wizard	
emote Device selection	C
Select the Remote Device for your iDigi Dia project	JUB
Remote Device	
OUse Current Remote Device	
Select Specific Remote Device	
Remote Device name: ConnectPort_X4	New

Figure 18: Create New Configuration



A new **Remote Device Configuration** is needed to work with each specific target device (your ConnectPort X4 in this case). Multiple remote configurations can be created for working with different devices.

a. After clicking the **New...** button, the Device Manager wizard dialog will open.

🐨 Device Manager	
Configure a remote target a Device Manager allows the creation	nd set it as the current configuration of configurations for different remote devices and associates each configuration with a symbolic name
Digi Device	The parameters for the communication between the IDE and the remote device can be easily (re)configured using this dialog. Additionally, the Device Manager allows the verification of communication between the host and the selected target device (current configuration). Configure Remote configuration settings from this dialog: Press the 'New' button to create a configuration of the selected type Press the 'Duplicate' button to copy the selected configuration Press the 'Duplicate' button to remove the selected configuration Press the 'Delete' button to collapse all the expanded remote configurations Press the 'Device Discovery' button to discover connected Digi devices. -Edit or view an existing configuration by selecting it
?	Set Current Close

Figure 19: Device Manager Home Page

Note: The left side of the dialog lists the Remote Configurations that exist in the Workbench.

Initially, there are no Remote Configurations listed in the Device Manager. To begin the process of creating your first Remote Configuration, enable the Device Manager to discover the ConnectPort X4 automatically by clicking the **Device Discovery** button.