AWAVE Getting Started Guide
Version: 1.31

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About this Document

The following annotations have been used to provide additional information.

🕮 Note

Note provides additional information about a topic.

⌦ Example

Examples are given throughout this document to help the user understand the terminology and the technology.

☼ Important

This symbol designates something very important for the user.

☠ Warning

The user should pay particular attention to this symbol.

FCC Statement

This device complies with Part 15 of the FCC Rules.

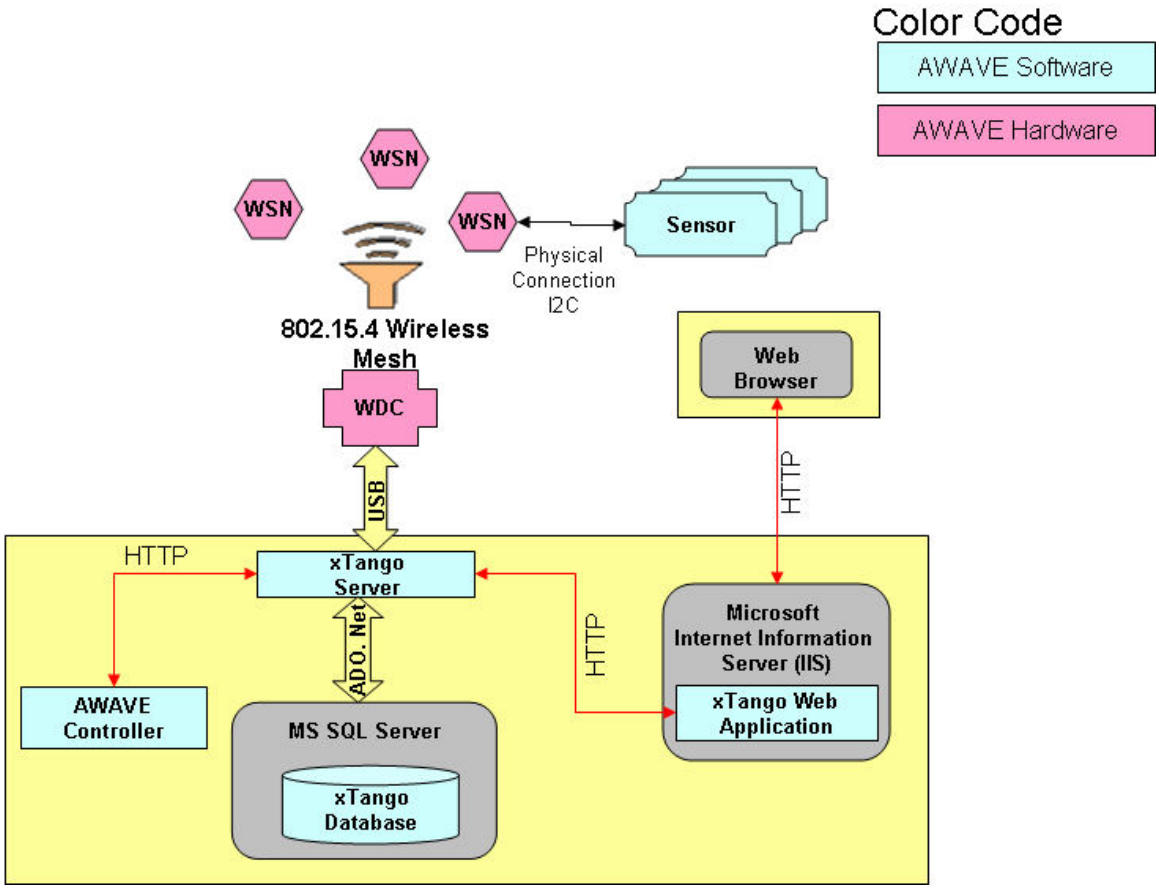
Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

AWAVE Platform Architecture



AWAVE Software Components

xTango Server

xTango Server is a operations server that handles command and control of one or more Tango Networks. The xTango Server is built using Microsoft DotNet technologies; written completely in C# . The xTango Server can be deployed on Windows Desktop, Windows Server and Windows CE platforms:

- Windows XP, Vista
- Windows Server 2003 or higher
- Windows CE v5.0

The xTango Server supports several programming models:

- Web Services (SOAP-RPC)
- C# Call Level Interface (C# CLI)
- Tango XML Protocol
- Supports several SAIL event delivery protocols:

- HTTP Post to a PhaseIV defined Web Service interface
- Email
- FTP
- JMS Message Bus

The xTango Server configuration is defined in a portable XML configuration file .

The xTango Server runs on:

- Microsoft Windows XP Service Pack Two - All editions (Home, Pro, Media Edition)
- Microsoft Windows Server 2003 - All Editions
- Microsoft Windows Vista - All Editions
- Microsoft Windows CE v4.2 and v5.0*

xTango Server Dependencies:

- Microsoft DotNet Framework v2.0
    - Microsoft DotNet Compact Framework v2.0 if running on a CE platform
- Microsoft SQL Server 2005 - All editions
    - Microsoft SQL Server 2005 mobile edition if running on a CE platform

xTango Database

- Microsoft SQL Server 2005 or Microsoft SQL Server 2005 mobile (when running on Windows CE)

xTango Web Application

- Microsoft Internet Information Server v5.1 or greater
    - Can run in Windows Cassini but is not supported by Phase IV Engineering

AWAVE Splash

- Microsoft Windows XP Service Pack Two - All editions (Home, Pro, Media Edition)
- Microsoft Windows Server 2003 - All Editions
- Microsoft Windows Vista - All Editions

AWAVE Splash Dependencies

- Microsoft DotNet Framework v2.0

AWAVE Hardware

Gateway Device

The gateway device is connected in a variety of ways to a server computer which is running the xTango Server. The gateway devices connect to the computer using one of the following ways:

- USB via a virtual serial port
- Bluetooth using Bluetooth serial protocols.
- Ethernet using an Ethernet COM Port redirector
- 801.11B/G using an Ethernet COM port redirector.

WSN Device

The WSN device or Wireless Sensor Node is the most flexible part of the AWAVE platform. WSN devices can come in the form of a simple relay node or a node with up to 16 different sensors. The most common WSN is a Wireless Sensor Node with a Temperature and Humidity sensor built into the node.

The Wireless Sensor Node(WSN) is the end device of the mesh network. The WSN in some configurations is called a Wireless Data Node or WDN and in its simplest form it is known as a Relay Node (RN). At the core each of these devices is built on the same hardware platform, each different device simply has more features, more memory, remote sensors and other enhancements. The WSN supports up to 32 remote sensors using an industry standard I^2C connectivity method.

Installing the Software

The first step to getting up and running is installing the AWAVE software platform. To do so follow the steps detailed below.

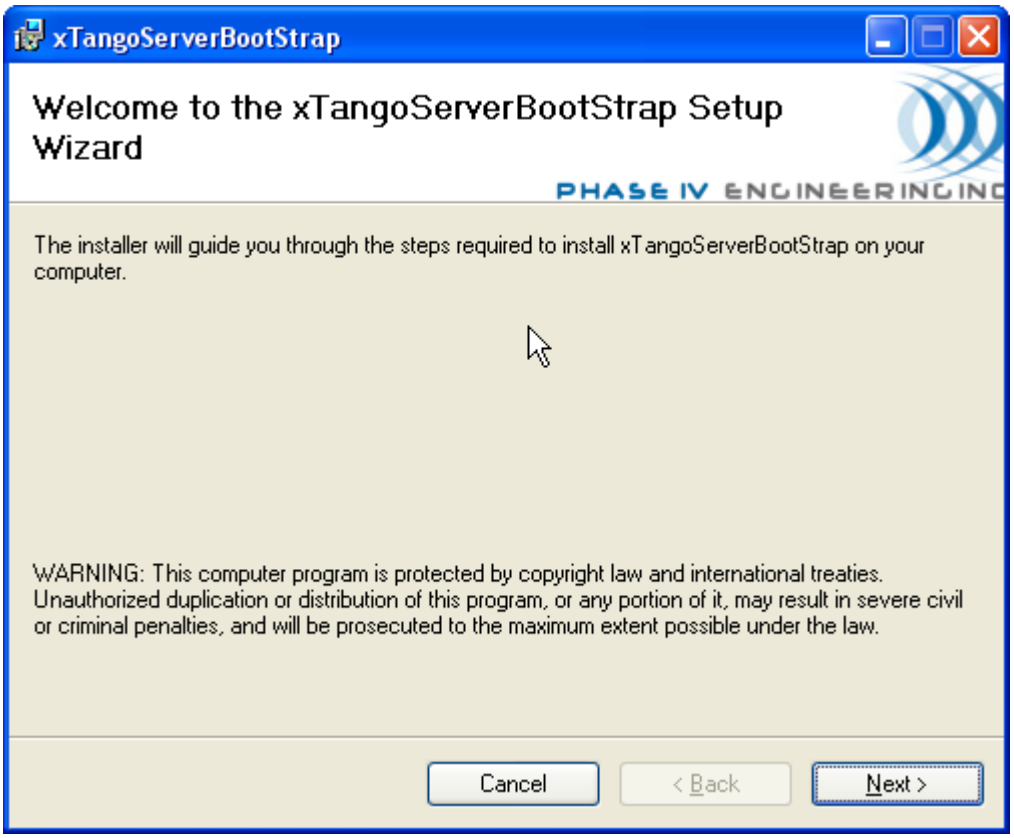
Initial Software Installation

The software installation starts by installing a bootstrap program and all required installation binaries into the desktop file system. The installation defaults to c:\program files\phaseivengr\xTangoServer and it is strongly recommended that the user NOT change the destination directory. If need be the user can change the destination but there may be manual configuration steps required.
On the installation CD-ROM in the root folder is the following file; xTangoInstallerSetup.msi which is the bootstrap installation binary. It will build the initial file system as discussed above and deposit all required pre-requisite install binaries into the Setup folder. Note: It will not deposit the DotNet Framework setup files. If the desktop does not have the required DotNet framework installed the user must download the installation from Microsoft and finish that install first.
Please see http://www.microsoft.com/downloads/details.aspx?familyid=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en to download the DotNet framework v2.0.
On some workstations you may also need the Microsoft Installer v3.1 or greater. Please see the following web site for the Microsoft Installer distribution.
http://www.microsoft.com/downloads/details.aspx?familyid=889482fc-5f56-4a38-b838-de776fd4138c&displaylang=en

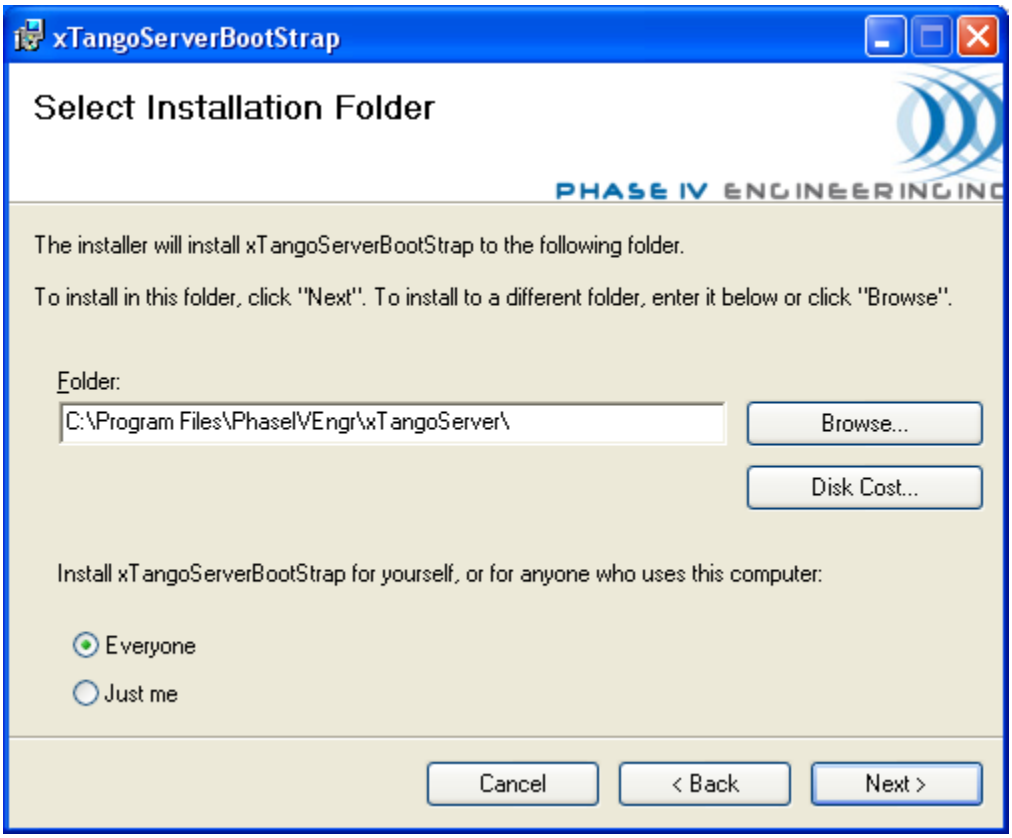
Installing the boot strap

This section describes the bootstrap setup process.

1. Using Microsoft Explorer navigate to your CD ROM drive and double click on the xTangoInstallerSetup.msi file. Doing so will present the following screen:



2. Clicking Next presents the following screen asking the user to choose a destination folder. The user can change the destination but PhaseIV Engineering suggests not changing the destination. Use the default of **Everyone**. The screen looks like the following:



3. Clicking next presents the Confirm Installation screen. Simply click next to start the actual installation. Let the installation progress and finally the installation complete screen is presented where the user can click **Close**.

At this point the boot strap is installed and the following files are deposited onto the system.
In the C:\program files\PhaseIVEngr\xTangoServer folder there are the following folders with the following files:

- **Bin**
  - **xTangoInstaller.exe:**
    The xTango boot strap tool.
- **Docs**
  - Nothing at this time is installed into the DOCS folder
- **Drivers**
  The following files are all part of the FTDI USB-Serial drivers. These drivers will be used during the initial WDC installation documented in the Developers Kit Hardware installation guide.
  - Application Notes.url
  - FTBUSUI.dll
  - ftcserco.dll
  - FTD2XX.dll
  - FTD2XX.H

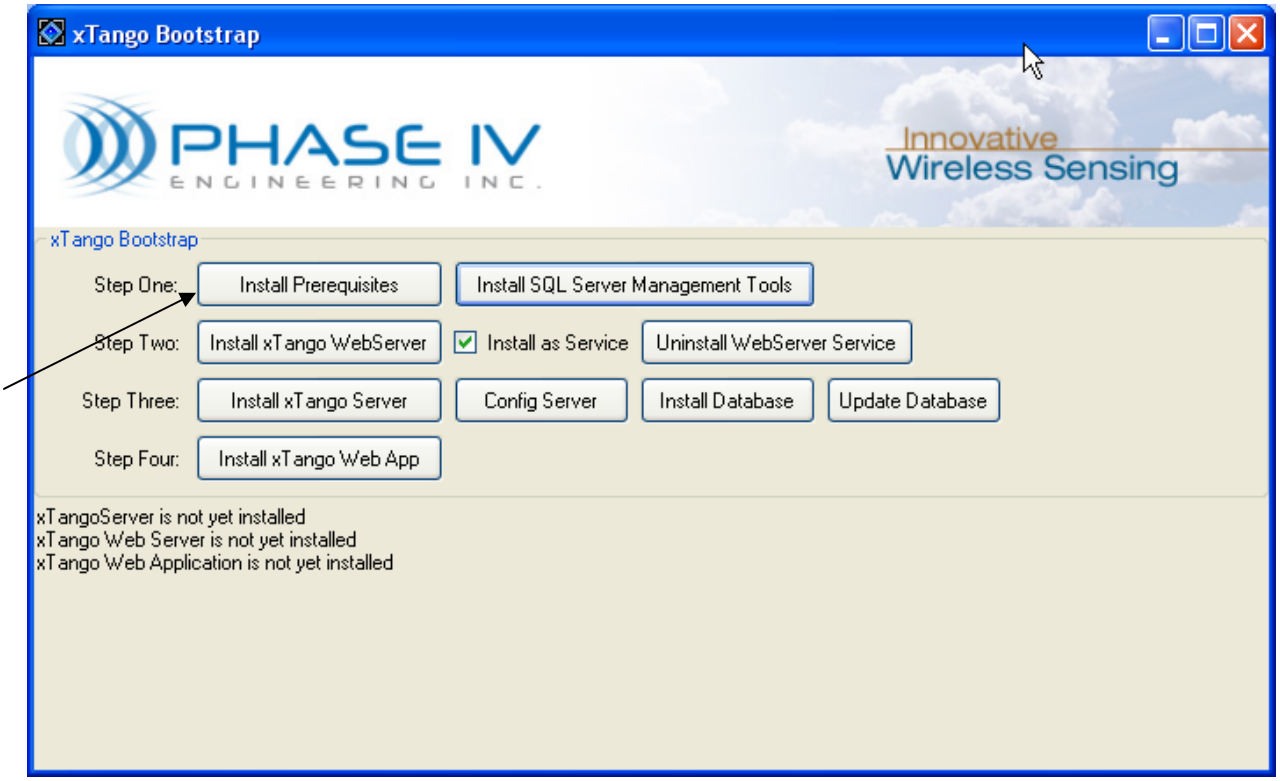
  - FTD2XX.lib
  - ftdibus.cat
  - FTDIBUS.INF
  - FTDIBUS.sys
  - ftdiport.cat
  - FTDIPORT.INF
  - FTDIUN2K.INI
  - FTDIUNIN.exe
  - FTLang.dll
  - ftser2k.sys
  - ftserui2.dll
  - Installation Guides.url
- **Setup** The following files are the final MSI files used by the boot strap tool.
  - SQLEXPR.EXE
    This file is the Microsoft SQL Server 2005 Express installation binary.
  - SQLServer2005_SSMSEE.msi
    This file is the SQL Server 20905 Management Console. It is not automatically executed by the boot strap but is available if the user wants direct management capabilities to the xTango database.
  - xTangoServerInstall.msi
    This file is the xTangoServer installation binary. It installs the xTangoServer application and the boot strap registers the server as a service automatically allowing it to start up at machine boot up. To disable automatic service startup please see appendix B in this document.
  - xTangoWebApp.msi
    This file installs the xTango Web Demonstration Application along with a zip file of the actual application source code and build environment. Note that the build environment is dependant upon the Microsoft Developers Studio 2005.
  - xTangoWebServerInstall.msi
    This file installs the small footprint xTango web server that is used to serve the xTango API web services. The API is further documented in the xTango Software Development Tool Kit documentation. The small footprint web server is ALWAYS installed into the c:\xTangoWebServer folder on the root folder of the C-Drive. If the user does not have a C-Drive the xTango Web Server can be installed in alternate folders and drives but manual configuration will need to be followed. Note also that the boot strap tool registers the xTango Web Server as an automatic start service. To disable auto-start of the service please see appendix B.

Using the xTango Config Boot Strap Tool

The boot strap is a small piece of software that guides the user through the rest of the development kit installation.

At this point the user has installed the boot strap tool and it is time to run the boot strap tool and install the other development tool kit components.

To execute the Boot Strap tool click on Start->All Programs->PhaseIVEngr->xTangoServer->xTango Config
This will open the xTango Config tool known through out this document as the xTango boot strap tool.



Follow the steps below to continue installing the AWAVE development Tool kit.

Installing the Prerequisites

Upon opening the xTango boot strap tool the following screen is presented:

The following descriptions will discuss each step of the installation.

The Install Prerequisites button installs the Microsoft SQL Server 2005 Express Edition.

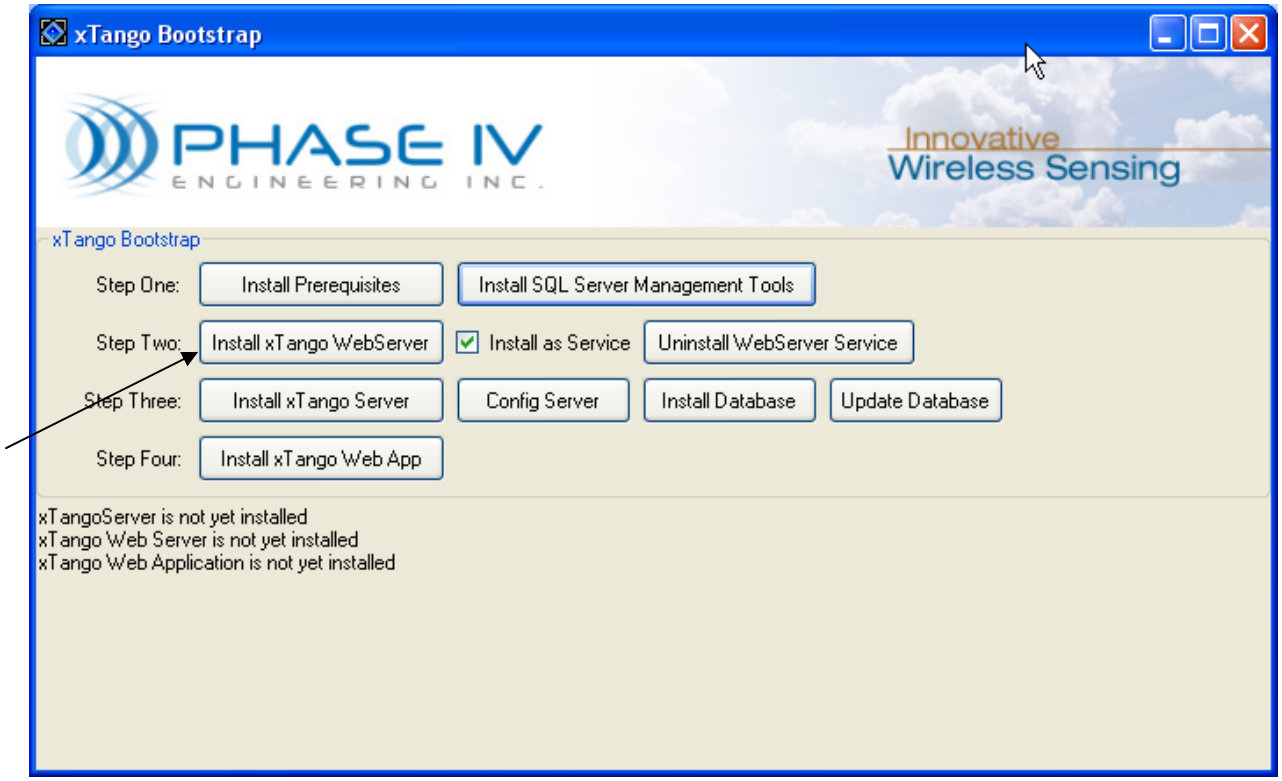
- SQL Server 2005 Express: The boot strap determines if an instance of SQL Server 2005 already exists on the desktop as well as if one does that it has an instance of SQLExpress. If the engine does not exist it will start the process of installing the SQL Server 2005 Express database software. SQL Server 2005 has many operating system dependencies that the boot strap installer does not detect. If the setup of SQL Server 2005 express fails please stop and follow the directions described in the SQL Server Express setup dialogs to get the errors corrected.

- The SQL Server 2005 Express installer will install the SQL Server 2005 Express database engine and create a default SQLExpress instance. The xTango Server database relies on the default however Appendix B describes alternative database deployment options for the tool kit.

- By default SQL Server Express installs using SSPI security which is tightly coupled to the Windows security mechanisms. If the user wants to use SQL Server security then please see appendix B for directions on how to reconfigure SQL Server 2005 for SQL Server security instead of SSPI security. Note that the xTangoServer configuration will need to change if the default SSPI security is not used.

The Install SQL Server Management Tools button will install the Microsoft SQL Server 2005 Express Edition Management Console. This tool can be used to do routine maintenance to the xTango database as well as the SQL Server 2005 Express database server.

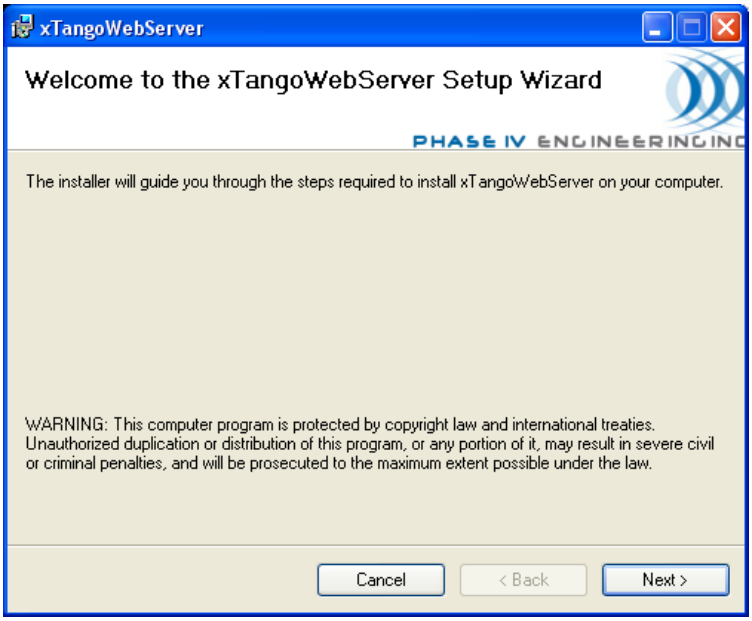
Installing the xTango Web Server



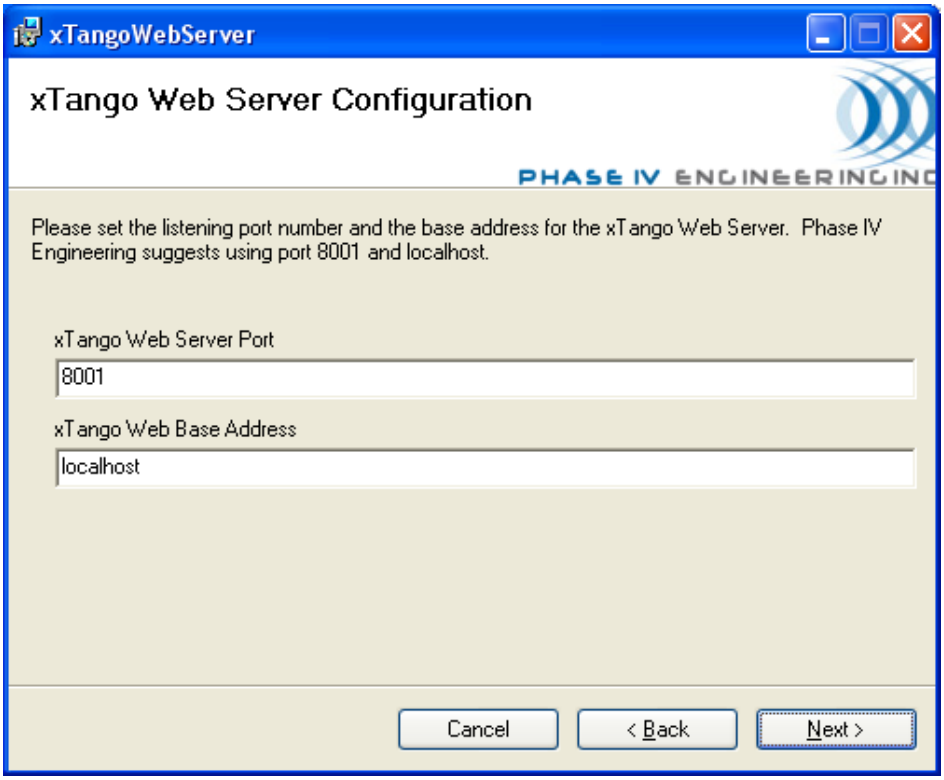
The Install xTango WebServer button will install the xTango Web Server into the c:\xTangoWebServer directory. This is a small embedded web server that allows portable web services capabilities. If the Install As Service check box is checked then the web server will be run as a service. Otherwise to start the web server use Windows Explorer to navigate to the c:\xTangoWebServer\bin directory and click on the application webs.exe. The default is to not run the xTango Web Server as a service.

Phase IV Engineering suggests that the Install As Service be unchecked to begin with. Once the user is more comfortable then the xTango Web Server can easily be configured to start as a service.

The steps of the installation are detailed below.



Click Next

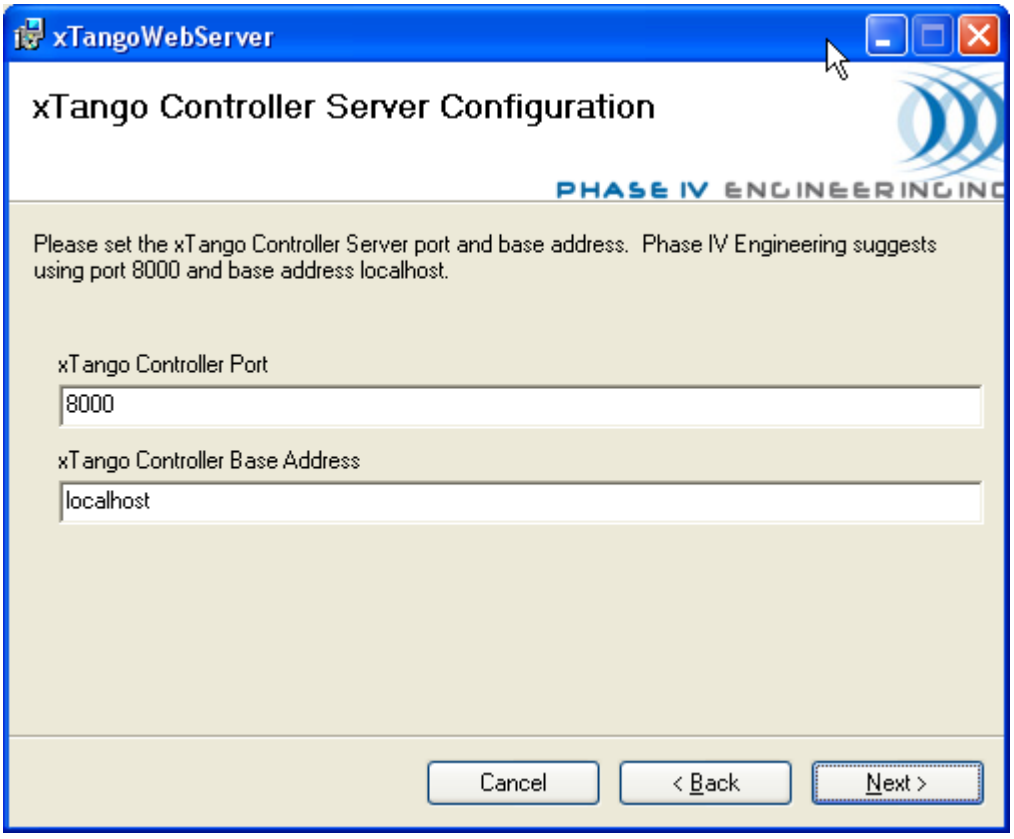


The xTango Web Server Port is the port address that the web server will listen on. Typically a web server uses port 80 but in many cases the developer's workstation will already have a Microsoft IIS running which is using port 80 so Phase IV Engineering suggests setting the xTango Web Server to use port 8001.

> **Tip:**
>
> If the user needs external access to the xTango Web Server then they will need to enable inbound connections to port 8001 through their personal firewall or their corporate firewall.
>
> The user could also setup a forward through their IIS server to allow a redirect to the local internal server from port 80 to port 8001. See the Microsoft IIS documentation for setting up a port map scenario.

The xTango Web Base Address needs to be always set to localhost.

Click Next

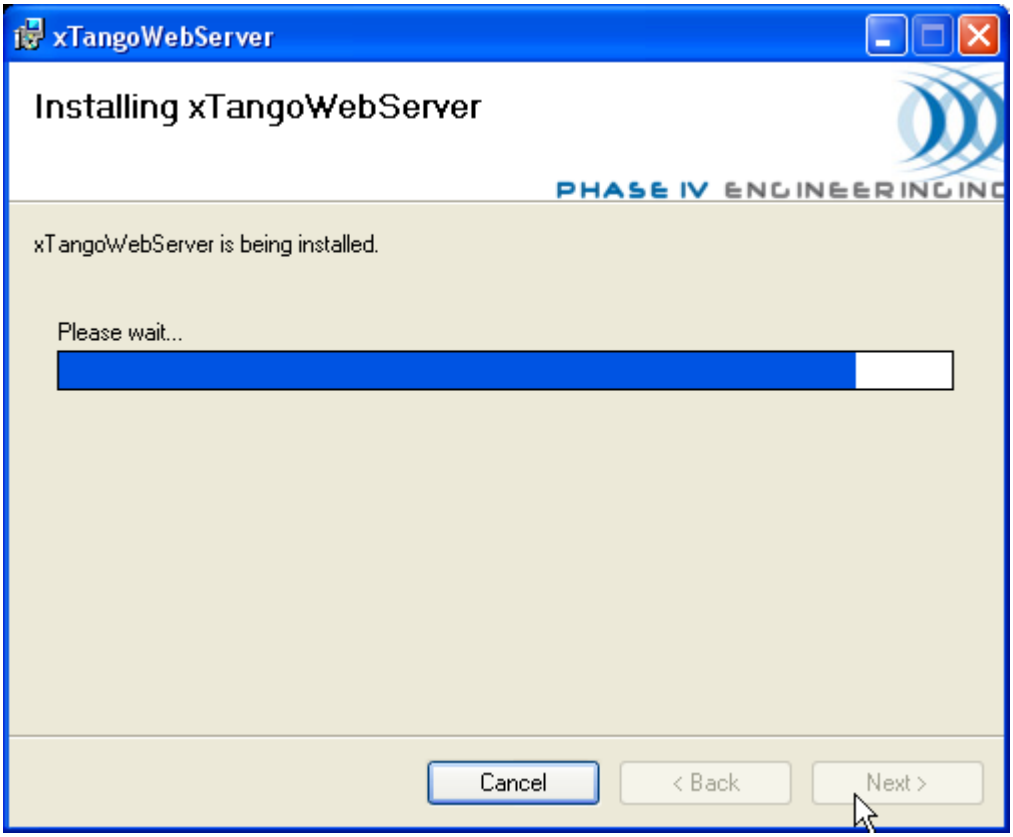


The xTango Controller Port is the port that the xTango Server is listening on. Phase IV Engineering suggests always using port 8000.

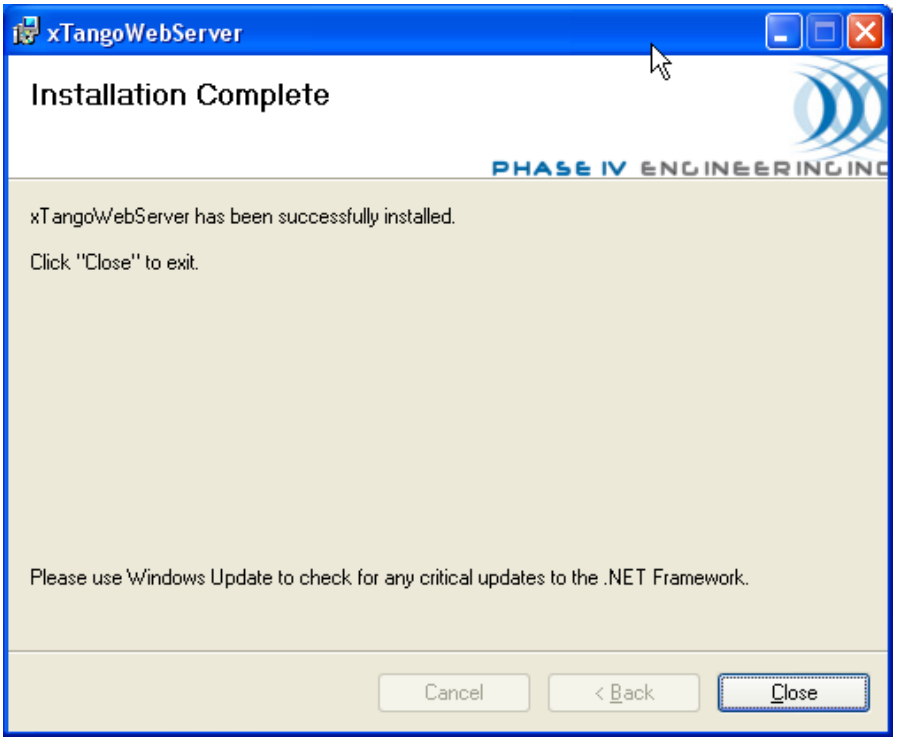
The xTango Controller Base Address is the machine name where the xTango Server was installed. Usually this is localhost but in the case where a developer has chosen to distribute the various AWAVE components this must be the machine where the xTango Server is installed.

> **Tip**
>
> If the xTango Server has been distributed to a different machine the machine where the xTango Server has been installed needs to be configured to allow port 8000 connectivity through that machines local firewall.

Click Next



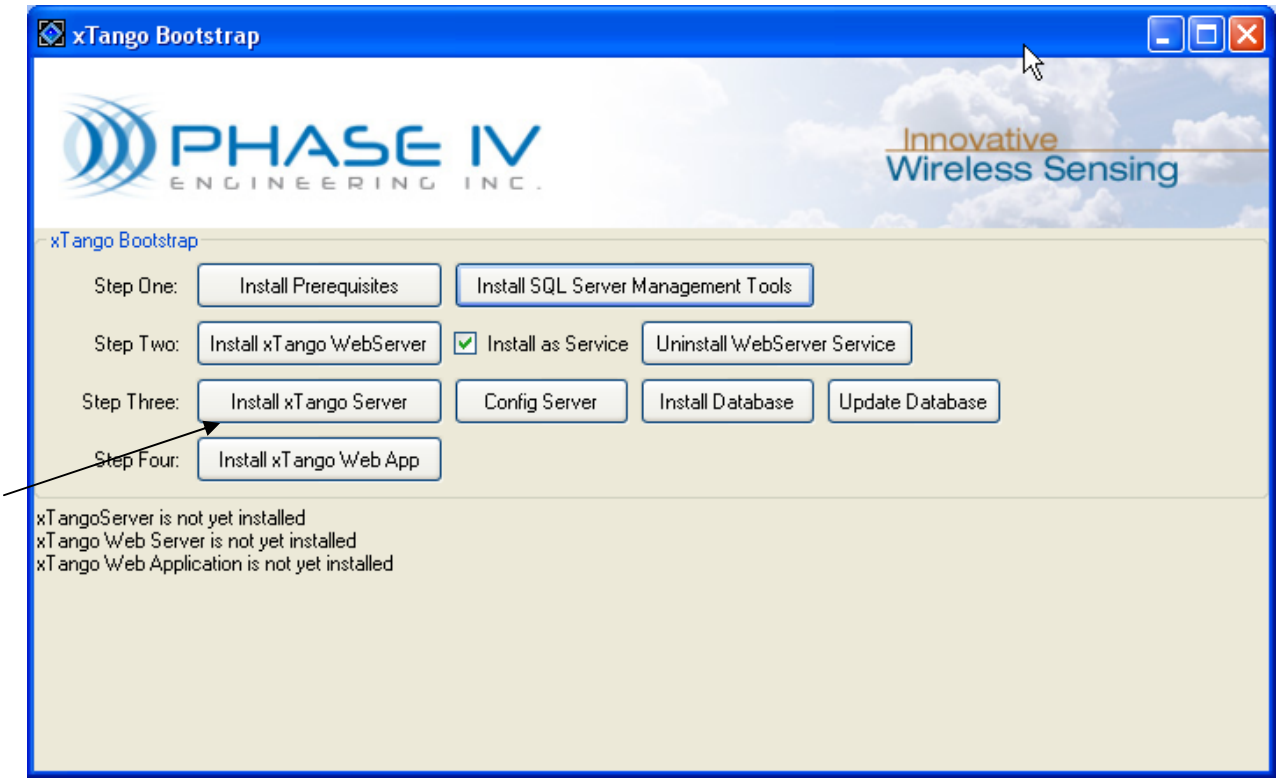
The install progress dialog is informational only.



Once the Web Server has been installed click close.

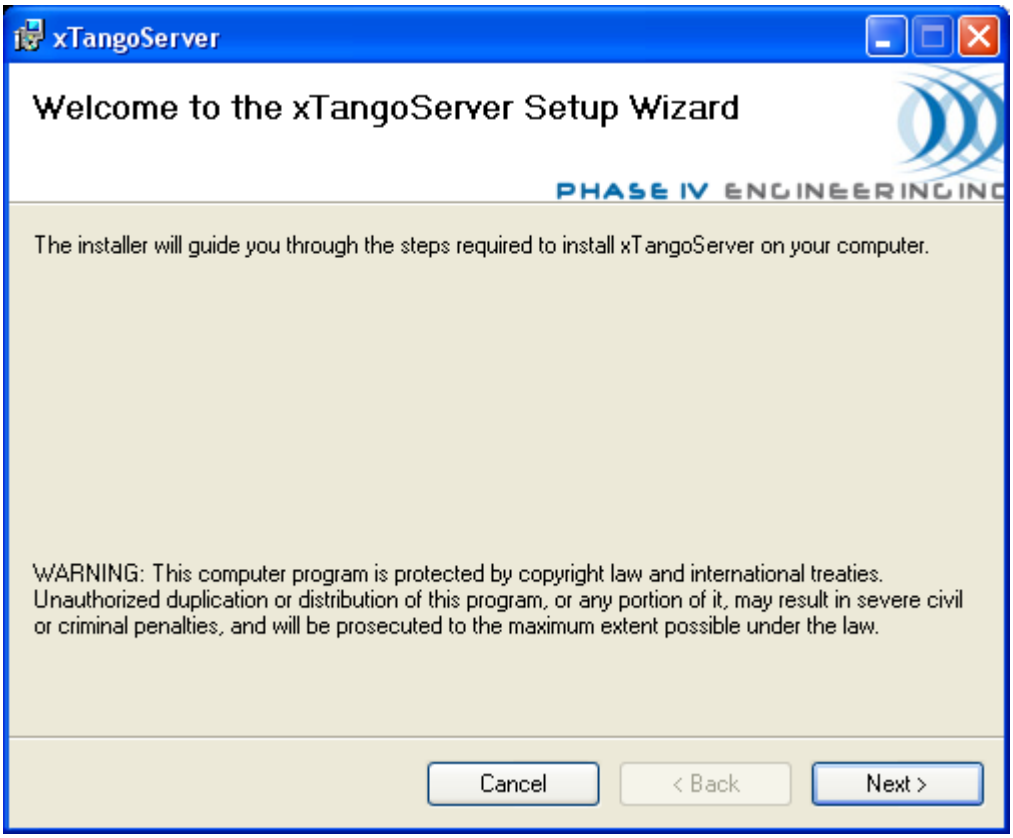
If the install as service was checked there will be a blank command prompt window up for a few seconds that is the script running in the background that is configuring the machine to run the xTango web server as a service.

Installing the xTango Server

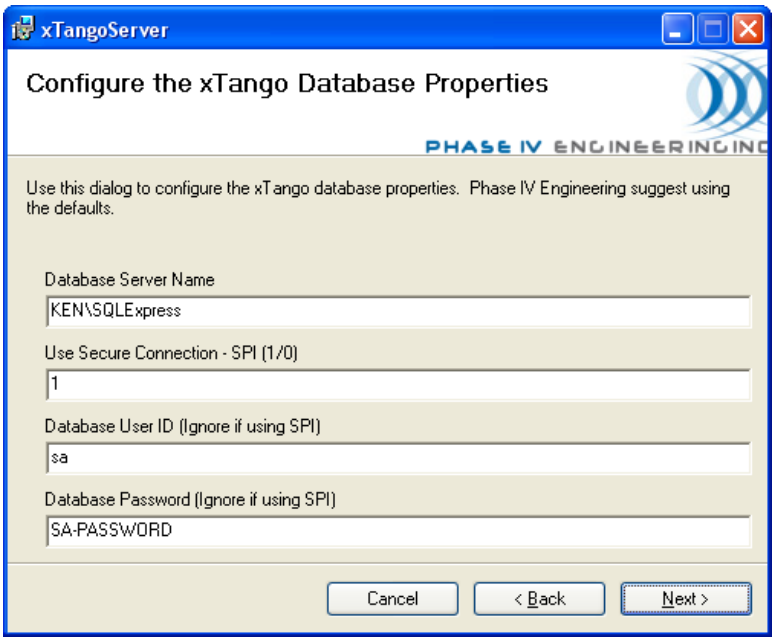


The Install xTango Server button will install the xTango Server. The buttons to the right are only useful once the xTango Server has been installed. If the use accidentally clicks one of the buttons to the right the Bootstrap tool ignores the click.

The xTango Server Installation has many steps and each step is described below. The first screen is the Welcome screen and it looks like the following:



Click next will present the License Agreement. Please first read the license agreement and if you agree to the terms please click "I Agree" followed by the next button which reveals the xTango Database Properties Dialog as follows:



Each of the properties and their definitions and suggested settings are described below.

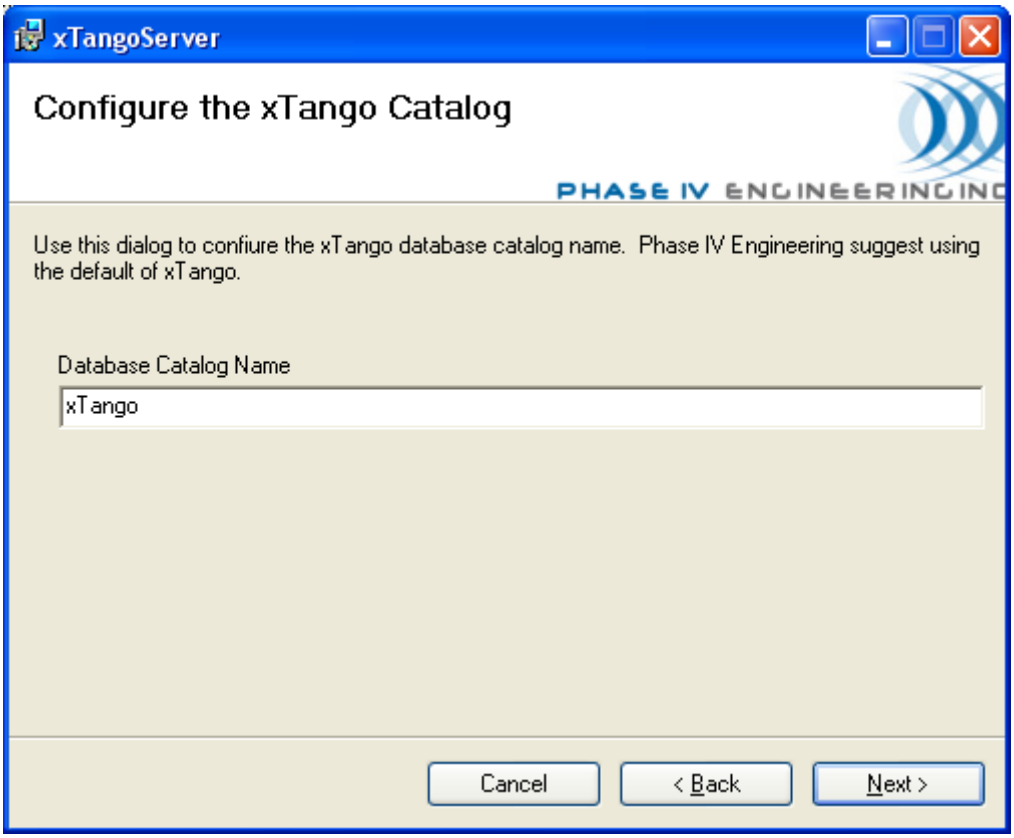
- Database Server Name:
  This should default to the desktop machine name followed by SQLExpress. It is recommended that the user NOT change this value. Also it is recommended that the user write this value down however it can be viewed using the Microsoft RegEdit registry management tool.

- Use Secure Connection:
  This is the Boolean value detailing whether the xTango Server is going to use Windows Integrated security or SQL Server security. If this is set to one then the Database User ID and Database Password are ignored. If this is set to zero then a valid SQL Server 2005 Express user ID and Password must be set. Note that the value must be a zero or one.

- Database User ID:
  A database user id that has access to the Master Database and has privileges to create databases in the SQL Server 2005 Express database engine.

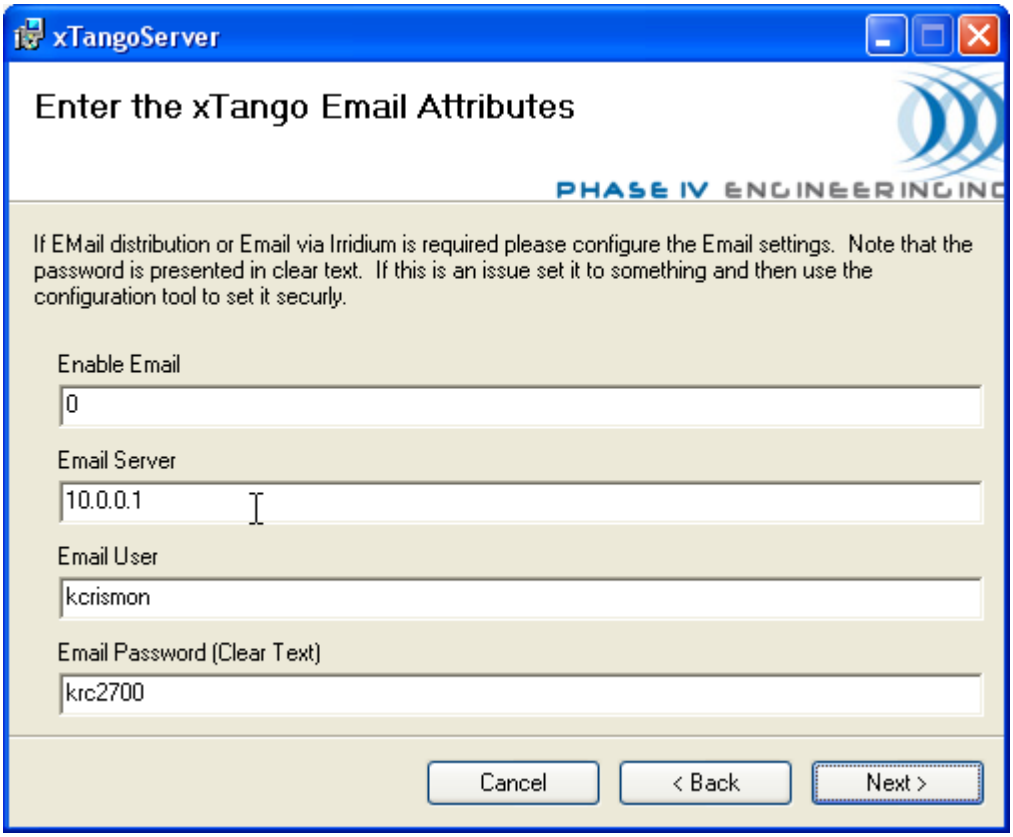
- Database Password:
  The password for the above mentioned database user ID.

Once all of these values are entered satisfactorily clicking next presents the xTango database catalog name dialog which looks like the following:



The database catalog is the database name for the xTango database. Phase IV Engineering recommends leaving this as xTango. If the user decides to change this value then some manual configuration will be required which is discussed in Appendix C.

Once the catalog name is configured satisfactorily clicking next presents configure the Email Configuration.



In some configurations a WDC may be enhanced with an iridium modem that will deliver AWAVE platform commands remotely to a AWAVE network. For the xTango Server to receive these email commands the email system must be configured. By default this feature is disabled.

The email properties are as follows:

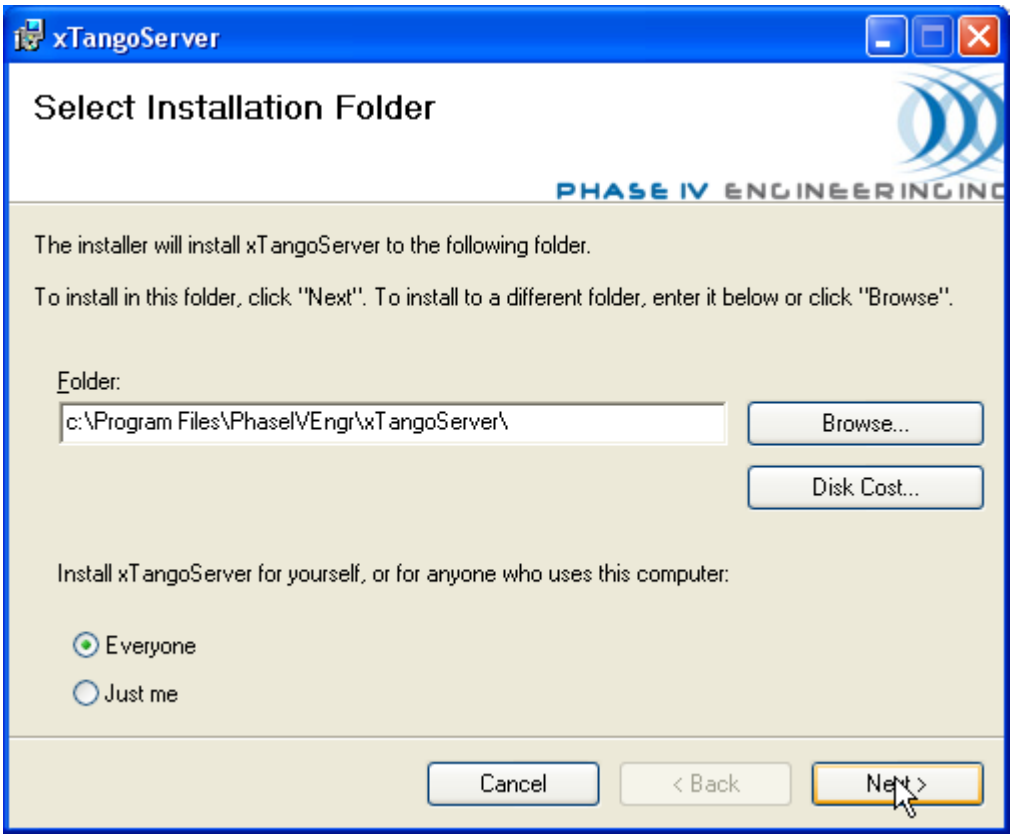
- Enable Email:
  Tells the xTango Server to poll the mail box configured below. The valid values are a zero for disabled or one for enabled.

- Email Server:
  The email server where the AWAVE commands will be delivered to. The xTango Server MUST have TCP connectivity (SMTP) to the configured server. A server may be configured by machine name if there is solid Domain Name Services in the network or by IP address if not.

- Email User:
  The email mail box user. This should be the email box user id for the mail box where the AWAVE command message will be received. xTango Server polls this mail box for AWAVE commands and operates on the commands as they are received.

- Email Password:
  The email mail box user's password.

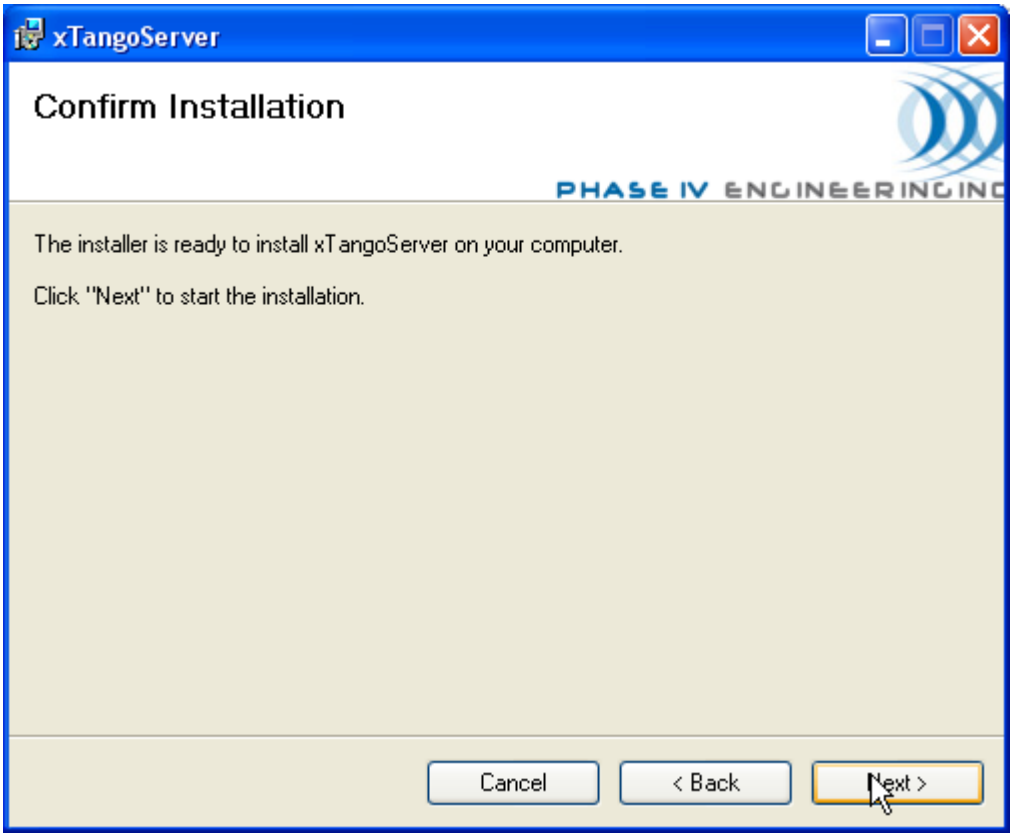
Click Next



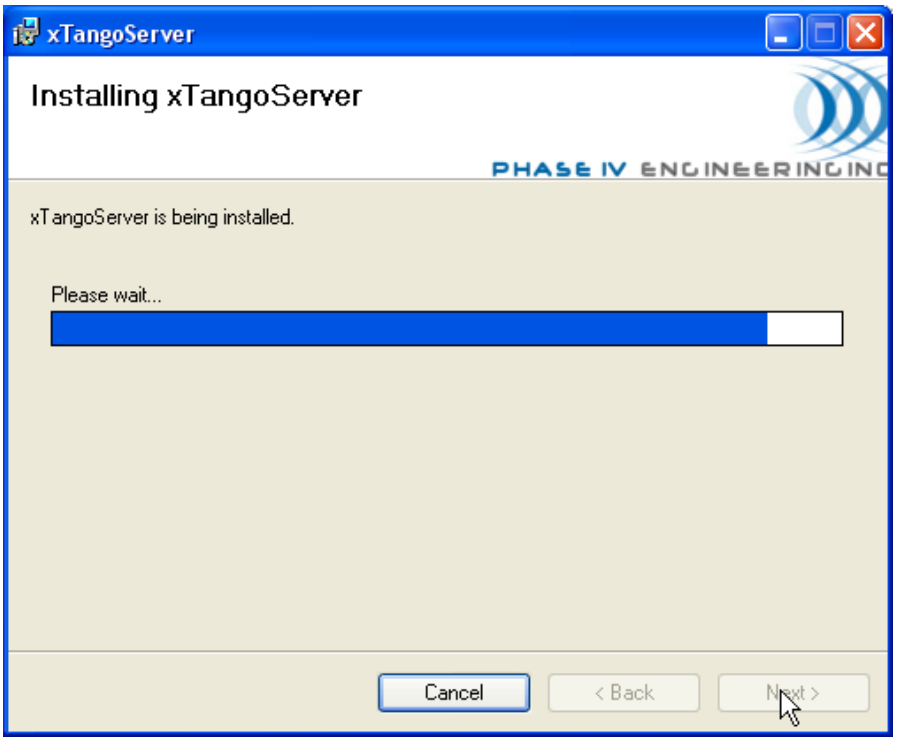
Use the defaults here and click next.

Tip

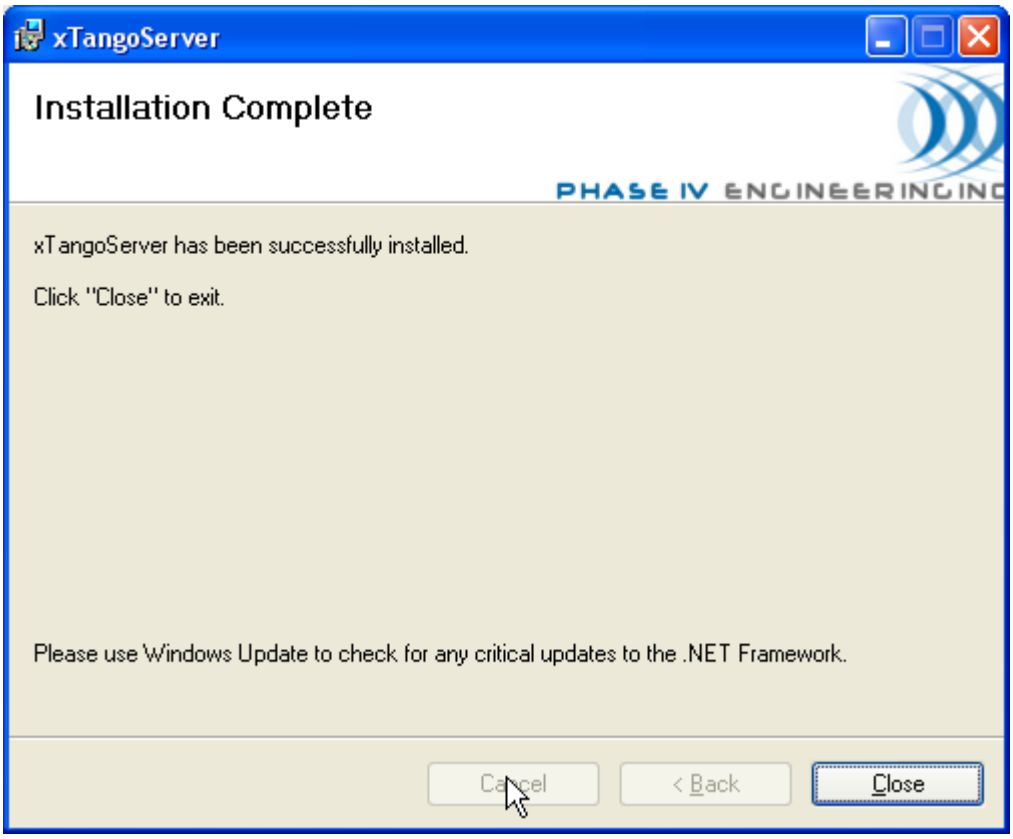
A user can choose a different place to install the xTango Server and if they do they must remember where they installed the xTango Server to be able to accomplish any manual configuration steps.



Click next here will start installing the xTango Server.

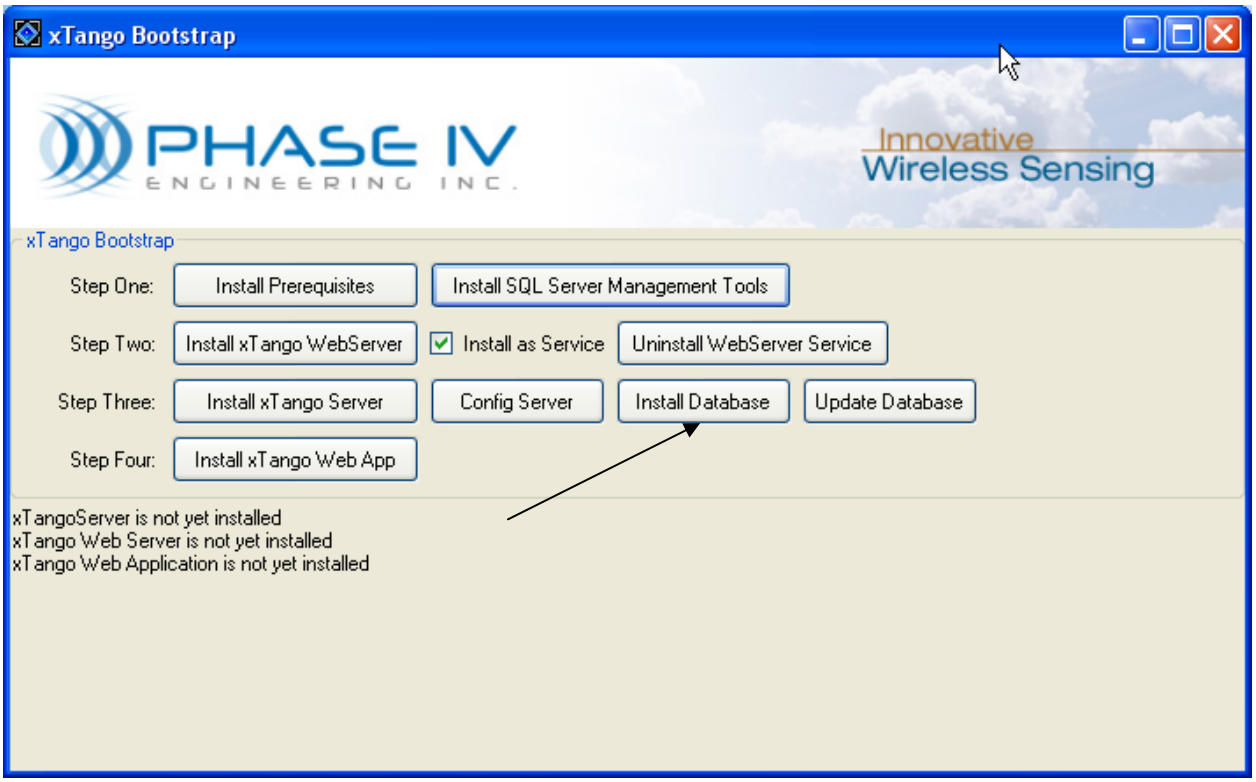


Once the xTango Server has been installed the installation complete screen appears.



Click Close

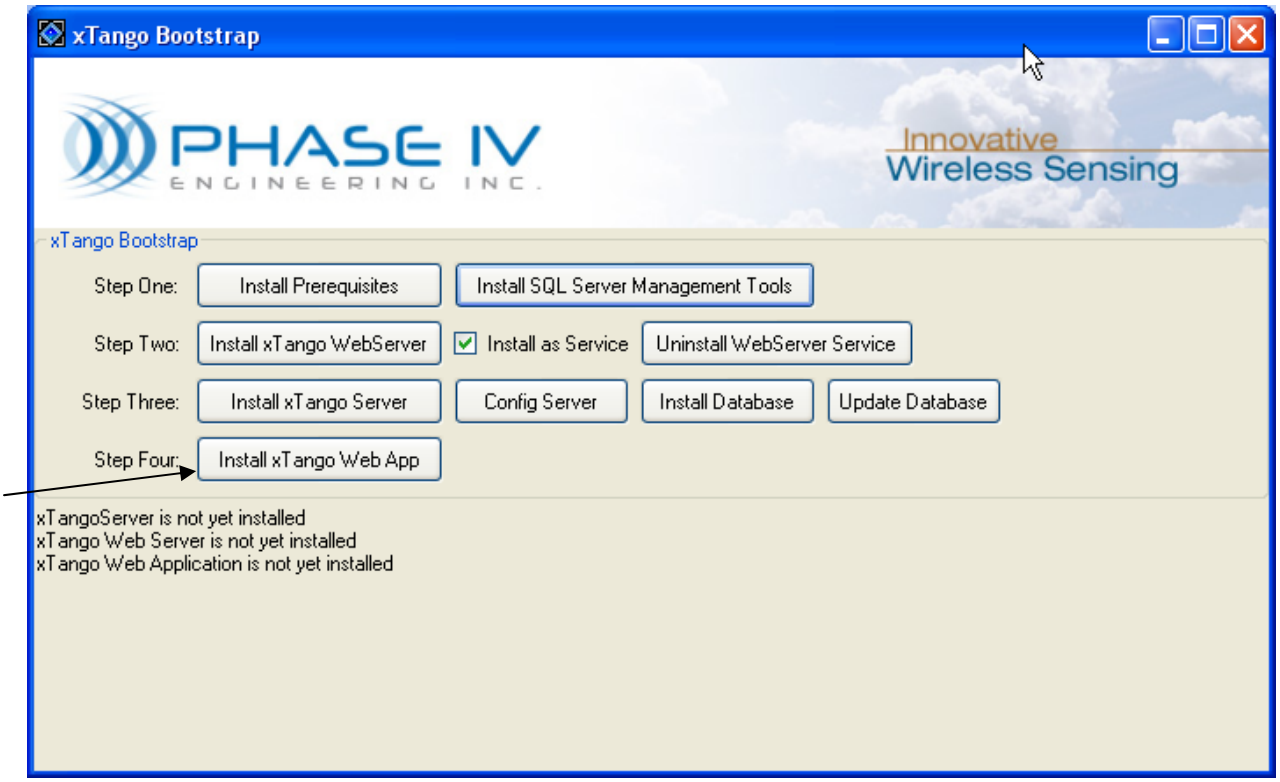
Installing the xTango Database



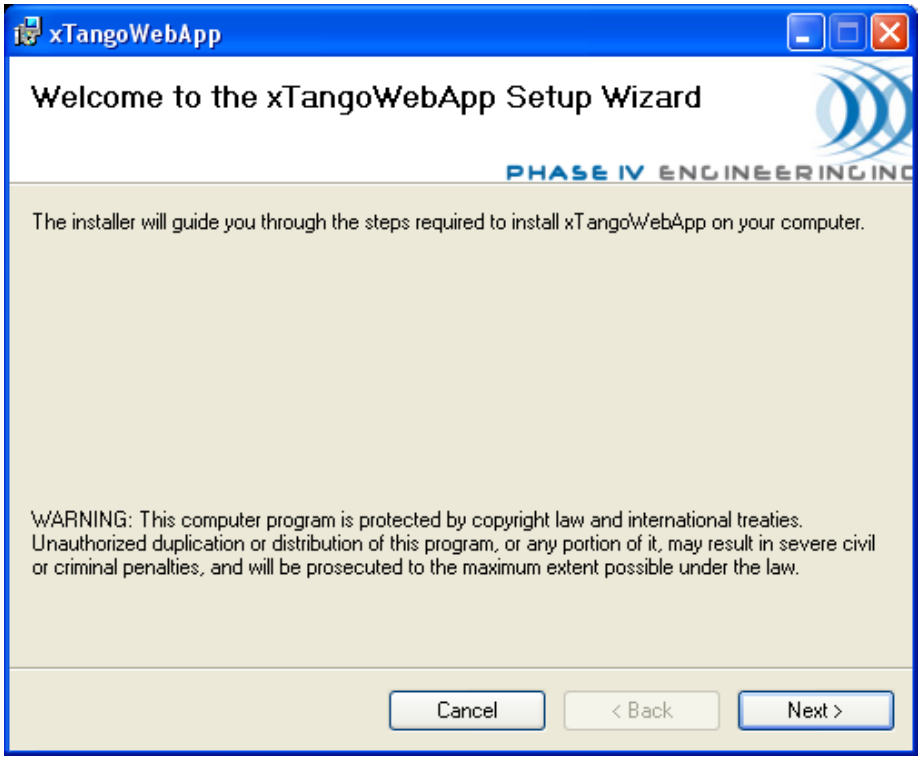
If the xTango database has already been installed the Bootstrap ignores the click. If the database has not yet been installed the Bootstrap will create the database and build all required database objects as well as populate it with the required seed data to get the developer started.

There will be a progress bar that shows the overall database install and table object create progress. The process usually takes only about 30 seconds to install and configure the xTango database.

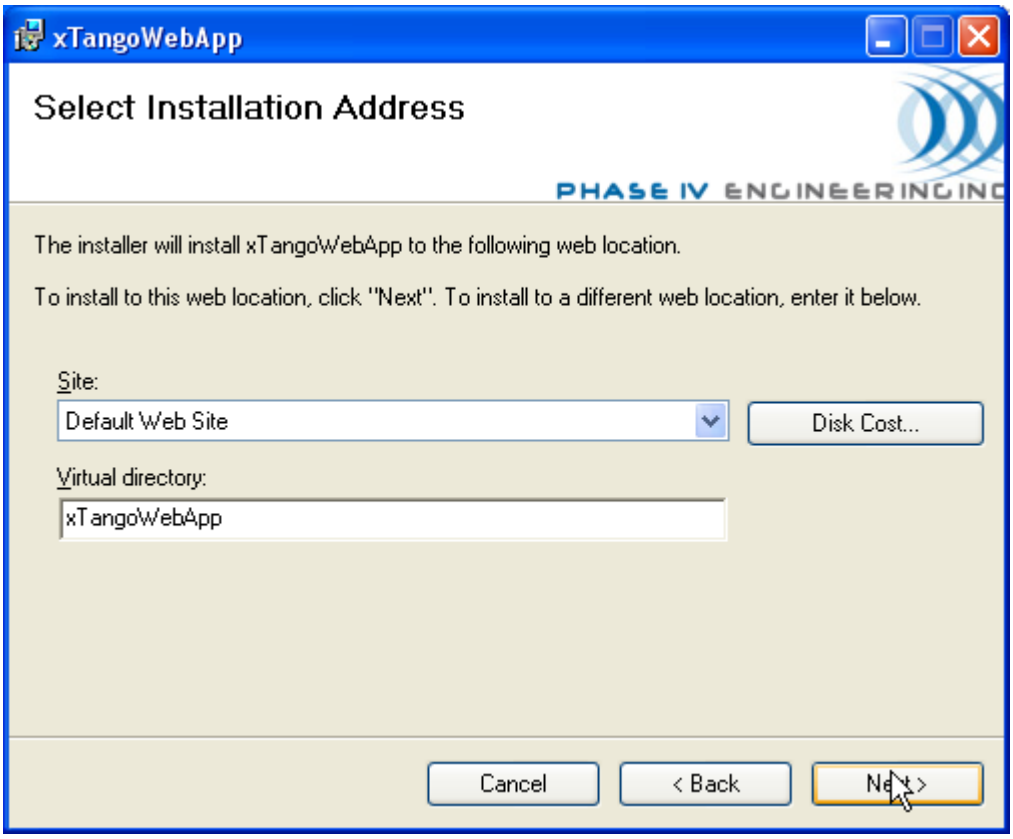
Installing the xTango Web Application



The Install xTango Web App button will install the xTango Web Application into the workstation's IIS server.



Click Next



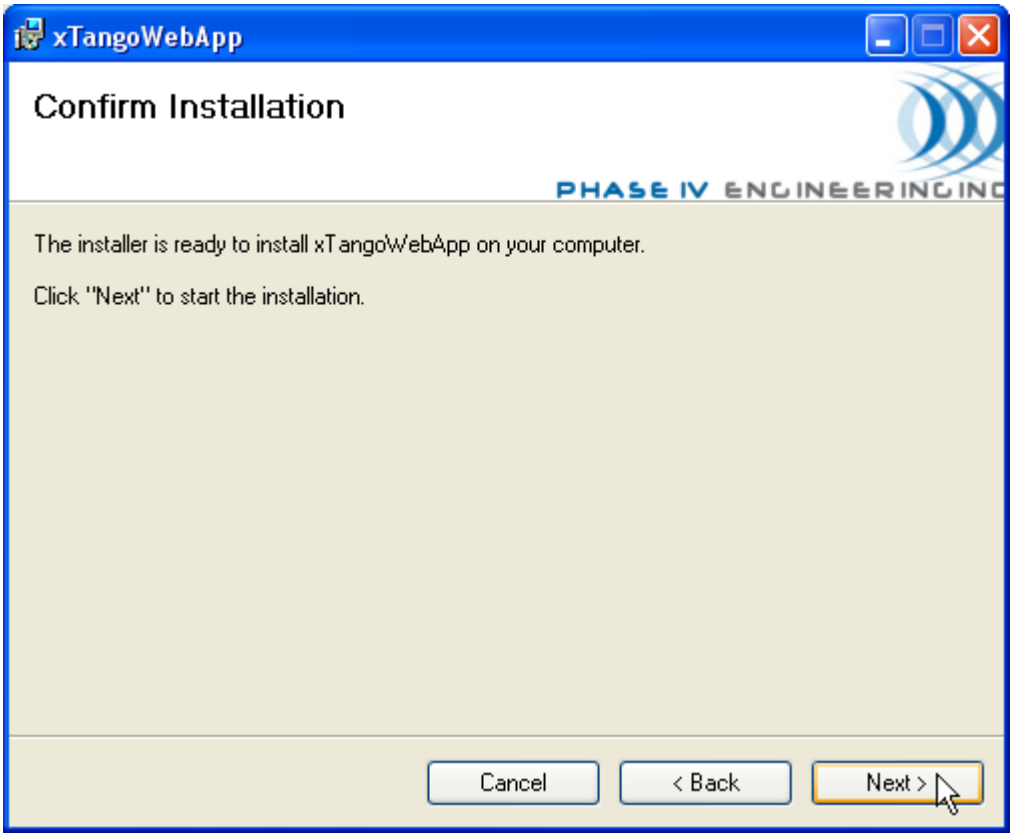
There are two parameters here. Phase IV Engineering suggests that both of these parameters be set to their default values. If a user should decide to change these then some manual configuration will need to be accomplished.

The parameters are as follows:

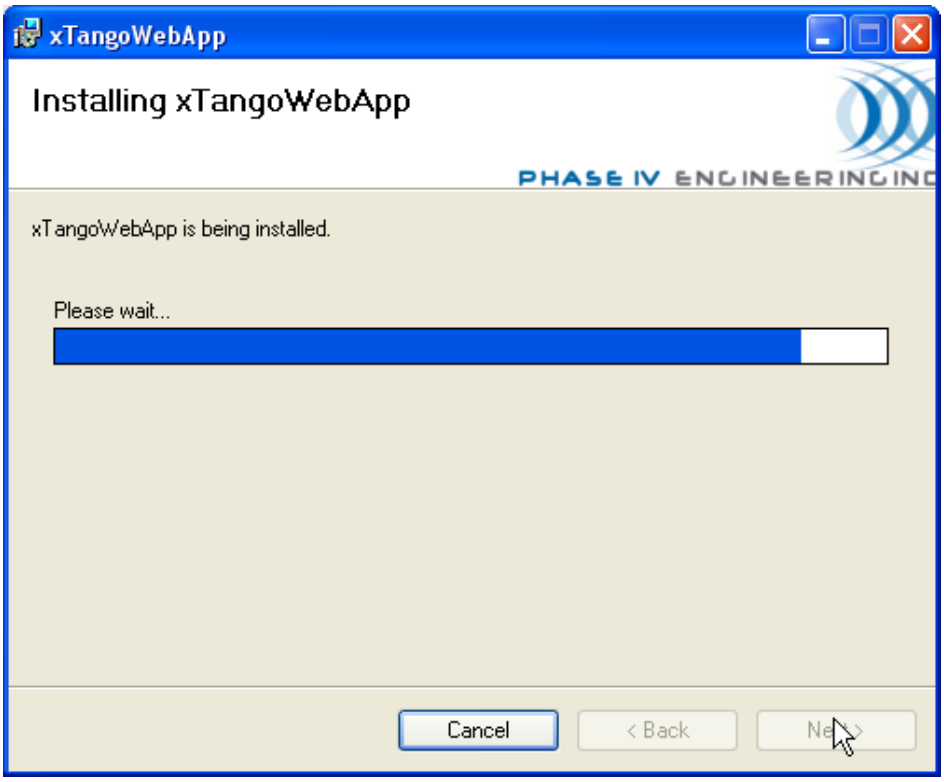
- Site:
  The IIS web site. IIS can manage several web sites, there is usually one labeled default web site and Phase IV Engineering suggests installing the web application into the default web site.

- Virtual Directory:
  The IIS virtual directory under the Site that the application will be installed. Using the default of xTangoWebApp will simplify all other configurations.

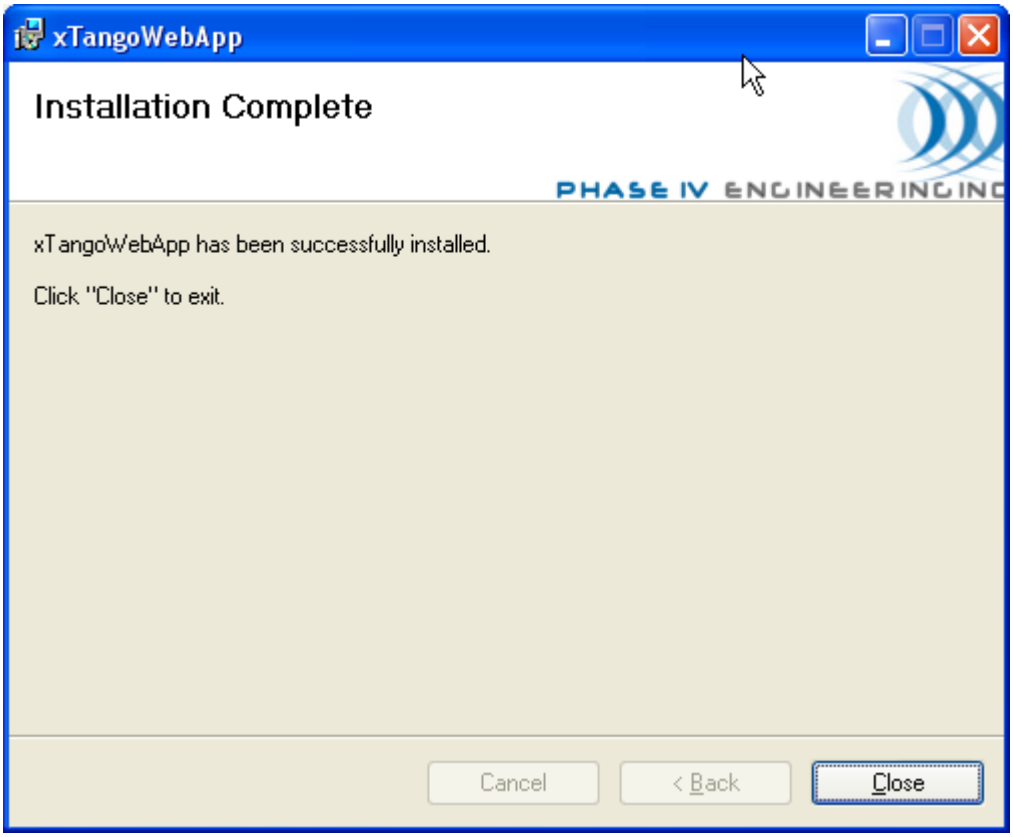
Once the parameters are configured click next.


xTangoWebApp
Confirm Installation
PHASE IV ENGINEERING INC
The installer is ready to install xTangoWebApp on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >

Click Next.


xTangoWebApp
Installing xTangoWebApp
PHASE IV ENGINEERING INC
xTangoWebApp is being installed.
Please wait...
Cancel
< Back

This is the installation progress screen. Once it is done installing the xTango Web Application the Installation Complete screen will appear.



Click Close.

The xTango Web Application leverages the DOT dynamic image generation tools which require read and write access to the file system. Because of this requirement IIS must be configured to allow read and write access to the system temp directory. The easiest way to accomplish this task is to enable Administrator authority to the following list of Windows Users.

- IUSR_<Machine Name> example; IUSR_KEN
  The Machine Name is the name of the machine that IIS is installed on. In the example, the machine name was ken, thus IUSR_KEN is the user to put into the administrator group.
- IWAM_<Machine Name> example; IWAM_KEN
  The Machine Name is the name of the machine that IIS is installed on. In the example, the machine name was ken, thus IUSR_KEN is the user to put into the administrator group.

Getting Connected

To get connected the xTango Server software must know the Gateway port to connect itself to. This document will discuss getting connected to a USB tethered gateway.

Plug in the Gateway

The Gateway must be plugged into the USB port of the computer where the xTango server software is installed. If the FTDI USB to Serial hardware drivers have not been installed the Windows XP workstation will bring up a wizard helping the user install the correct drivers.

If the workstation already has the drivers installed then the Windows operating system will show a new COM port. Using the System Properties/hardware/Device Manager make sure that the new COM port is enabled. This COM port is dynamic; meaning that when the WDC is unplugged the USB to Serial COM port will go away.

TIP 🕮

The Gateway draws its power from the USB port. Once the Gateway is unplugged it is no longer managing the xTango Wireless Network. In fact all WSN's in the network will operate in their last known state until they recognize that their Gateway is no longer present. At which time the WSN's will put themselves in a power preservation sleep mode or as we like to call; RF Quite Mode.

Start up required software

The AWAVE xTango software needs to be started in the following order.

xTango Web Server

The xTango Web Server is usually located in c:\xTangoWebServer\bin\webs.exe. Use the Windows Explorer to navigate to the webs.exe and double click on the webs.exe application. Note that when Webs starts it places an ICON in the task bar similar to the picture below.

Figure 1 – xTango Web Server Task Bar

xTango Server

The xTango Server is the xTango Wireless Mesh Network control software. It is the window into the wireless mesh network. It is usually located in c:\program files\phaseivengr\xTangoServer\bin\xTangoServer.exe
Click on Start->All Programs->PhaseIVEngr->xTangoServer->xTango Server to start the xTango Server application.

If the xTango Server is configured with the correct USB to Serial COM port the start up will look as follows.

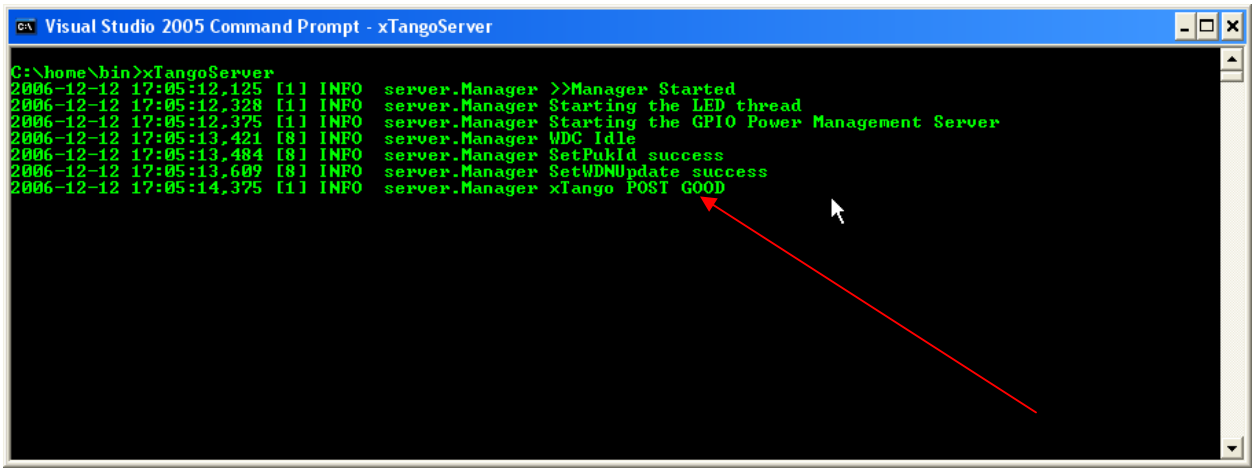


Figure 2 – xTango Server normal startup

If the USB to Serial COM port is not configured correctly the xTango Server startup will look like the following.

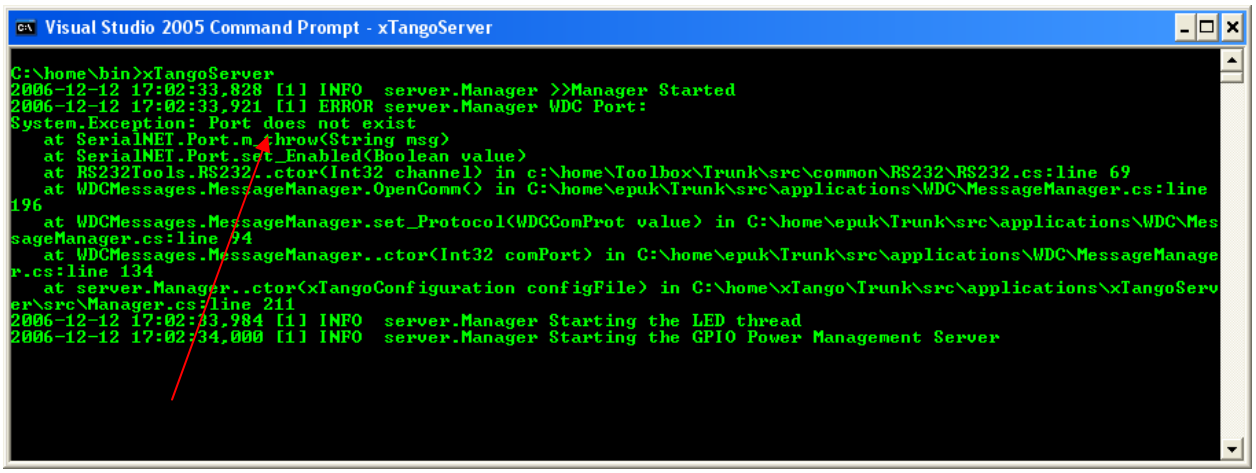


Figure 3 – xTango Server startup error; bad COM port

To resolve this issue the user must resolve their USB to Serial COM port. See the AWAVE Development Tool Kit Installation Guide for details on the resolution process.

If the xTango Server does not have access to the database server the xTango Server start up will look like the following.

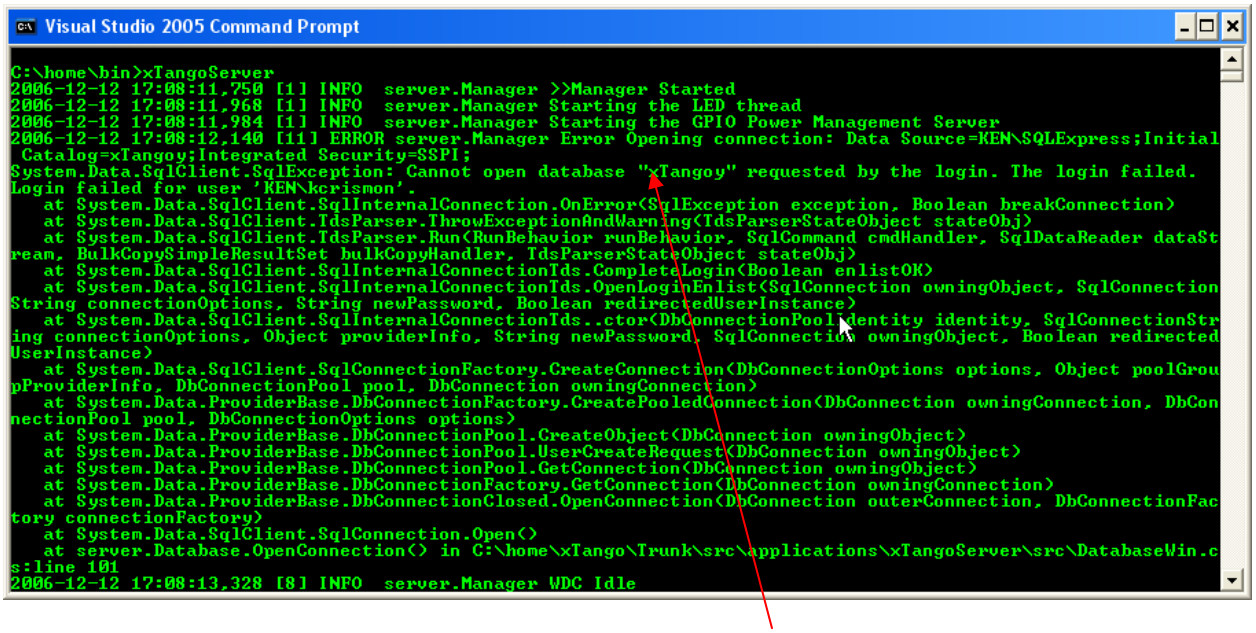
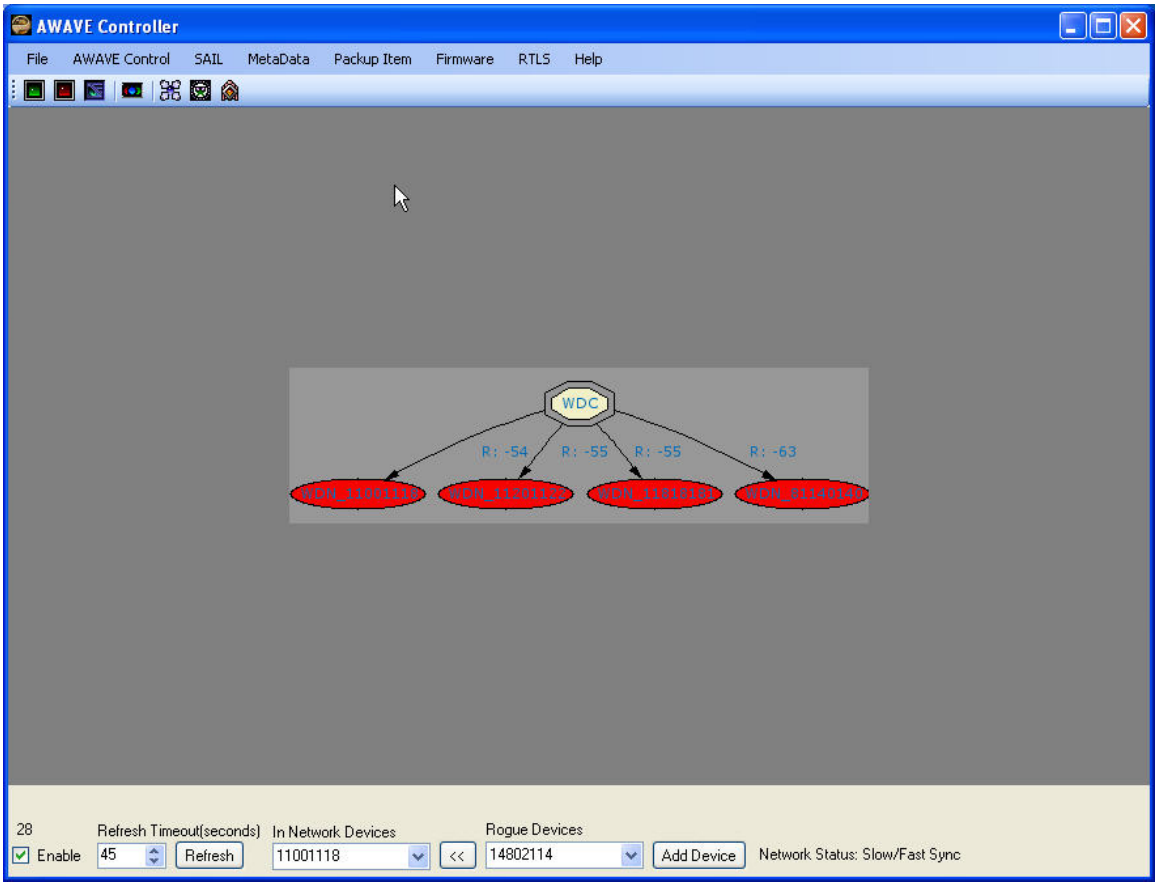


Figure 4 – xTango Server startup with bad database configuration

In the example above the database name was incorrect. If the database server name was incorrect or the instance name then other messages will appear similar to the one above but with different details. To resolve this use the xTangoInstaller.exe application. See the AWAVE Development Tool Kit Installation Guide which describes how to configure the xTango Server.

Start up AWAVE-Splash

In your c:\program files\phaseivengr\xTangoServer\bin find the AWAVE-Splash.exe and open it up. You will be presented with a screen similar to the following:



AWAVE Splash is used to start, stop, configure and manage your AWAVE wireless sensor network.

For more details please see the online users documentation that has been delivered with the AWAVE-Splash application.

<End Document>