iNet2X10+ User Guide

Version 1.00

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Version 1.00

## Table of Contents

iNet2X10+ User Guide
Version 1.00

Introduction

Today X10 technology is readily available, affordable, and in wide use for home automation. This document describes Net2X10+ , an Internet to X10 integration bridge device. Using iNet2X10+ with an internet connected personal computer makes it very easy for you to access your X10 devices remotely. User configuration allows the iNet2X10+ to control up to 256 appliance/lamp modules. PIN security is also included to prevent unauthorized access and control.

The iNet2X10+ hardware is based on a Microchip™ PIC24FJ256GB110 microcontroller and a Zarlink™ MT88L70 DTMF receiver. It is a fully programmable embedded USB host. This guide describes the iNet2X10+ hardware specifically programmed to be an X10 integration device. The iNet2X10+ hardware is generic by design and is suitable for other applications. For those users that wish to use the iNet2X10+ module for other remote controlled applications, it can be reprogrammed by using the appropriate Mircochip™ PIC programming tools.

For a detailed description of the iNet2X10+ hardware please see the iNet2X10+ Developer Guide.

System Block Diagram
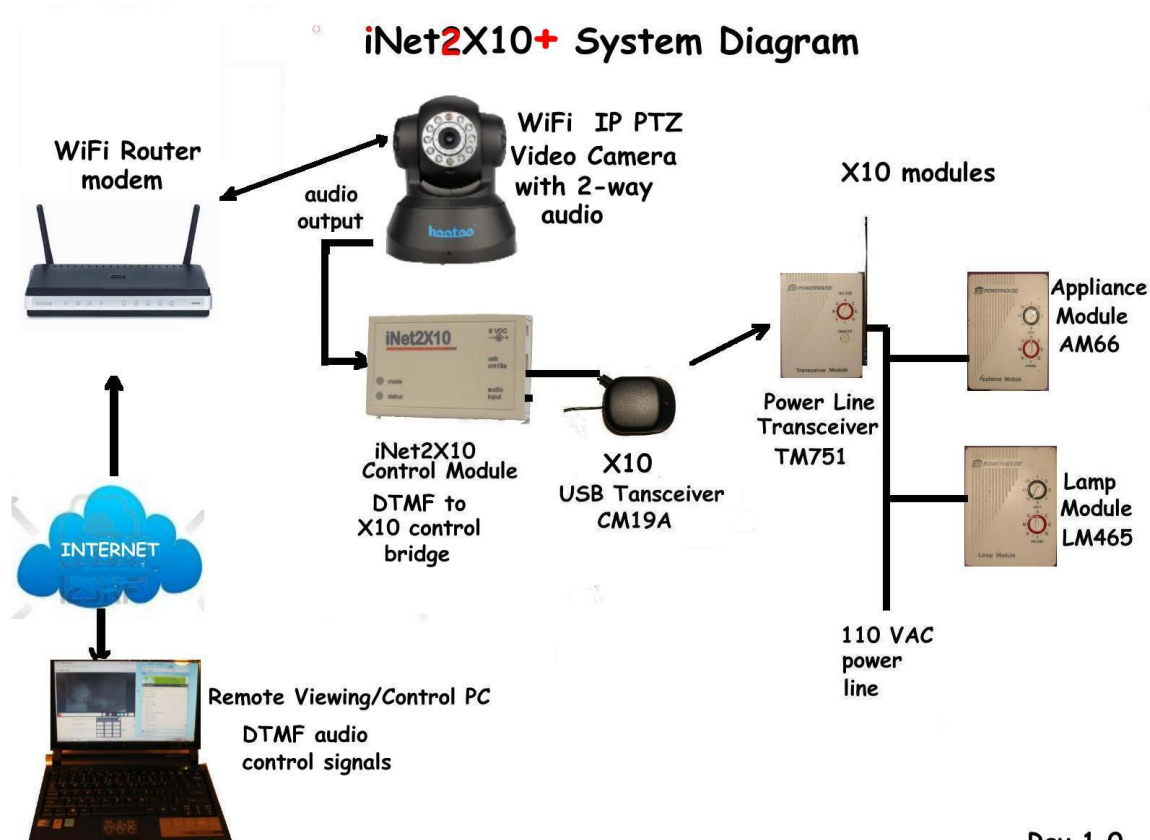
The system diagram illustrates the integration of an iNet2X10+ device with standard X10 components and a standard wireless/wired IP camera with two-way audio to enable remote access and control via the Internet.

iNet2X10+ User Guide
Version 1.00

Setup

This document only describes setup and installation of the iNet2X10+ device. Please refer to the instructions provided with the purchase of your X10 components.

Install and Configure X10 Devices

Install your X10 transceivers, and appliance/lamp modules (see System Block Diagram). Please refer to the specific setup instructions for each component. If you are installing the iNet2X10+ into an existing installation or do not want to use the default settings, you will need to define the devices to be controlled by iNet2X10+ using the commands described in the control mode below. If you are installing the iNet2X10+ into a new installation or want to use the default settings for the modules please be sure to configure your X10 devices to match the default settings. If you are using a large number of modules you may want to install just a few components for testing before installing everything. When using the X10 TM751 transceiver module, remember that it can only control units 1 through 16 for the house code selected. If you have other X10 modules selected on another house code you need another TM751 transceiver set to that same house code.

Install iNet2X10+
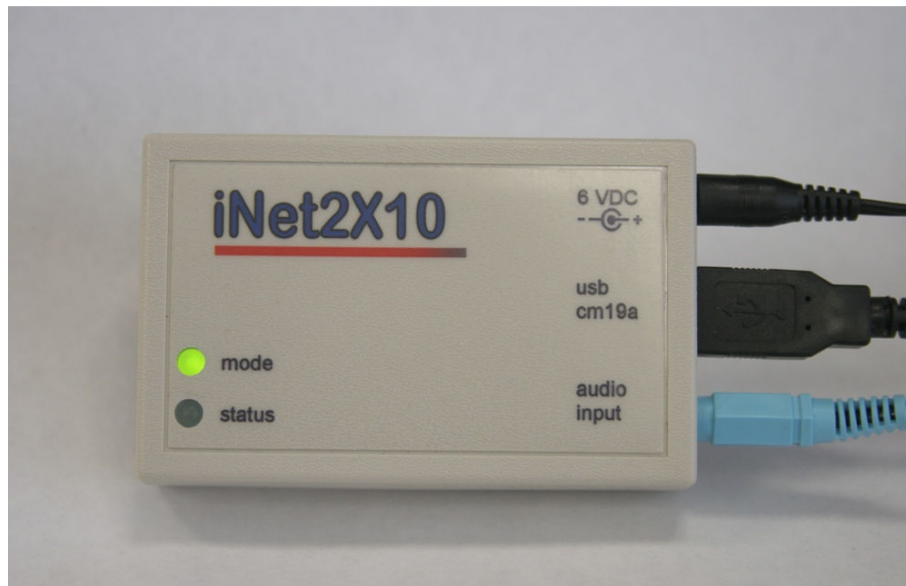
1) Insert the CM19A transceiver USB connector into the iNet2X10+ USB port.
2) Use a 3.5mm male to 3.5mm male stereo cable, insert one end of the audio cable (3.5mm stereo phone plug) into the iNet2X10+ audio input jack. Insert the other end into the audio output jack of the IP camera.

iNet2X10+ Connection to IP Camera

3) Insert the wall mount transformer into an AC outlet. Insert the power plug in the iNet2X10+ power jack. Both LEDs should blink once.
4) Inert the wall mount transformer into an AC outlet. Insert the power plug in the IP camera power jack.
5) Define your X10 devices if necessary, default settings are for House Code A.

X10 Transceiver, Appliance/Lamp Module Setup
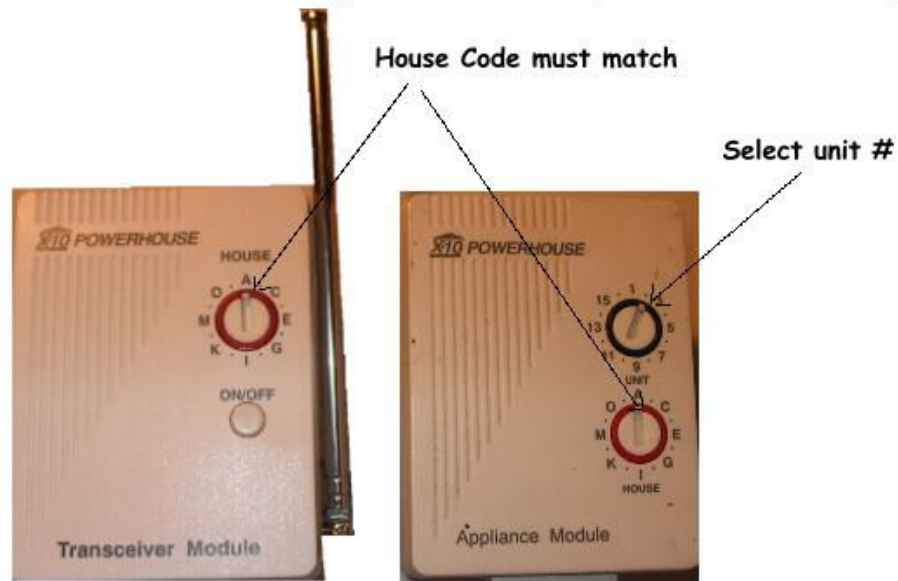
IP Camera Setup and PC setup

1) Select an IP camera that has two-way audio capability, this is required because DTMF audio tones are the control signals used to control the iNet2X10+ module.
2) Here are a few inexpensive IP cameras that can be used:
   a) Foscam FI8918W Wireless/Wired Pan & Tilt IP/Network Camera
   b) Wansview NCB-541W Wireless/Wired Pan & Tilt IP/Network Camera
   c) HooToo HT-IP206 Wireless WiFi IP Internet Pan/Tilt Camera
   d) Astak Mole Wireless WiFi IP Internet Pan/Tilt Camera
3) Follow the setup instructions on the IP camera you select.
4) The IP camera has an audio output jack for and external speaker, use the audio cable to connect to the audio input of the iNet2X10+ unit.
5) Connect the earphone to microphone patch cable on the PC you are using for viewing and control.
6) On the PC's audio volume control make sure that the microphone is enabled and that the level is set at mid-way. The level may require adjustment if the system is not responding properly.

Details of the earphone to microphone patch cable diagram are shown below.

Earphone to Microphone Patch Cable

To PC Earhphone Jack

3.5 mm Stereo plug

3 2 1

GROUND R L

10K 5%

470 5%

3.5 mm Stereo plug

3 2 1

GROUND R L

To PC Microphone Jack
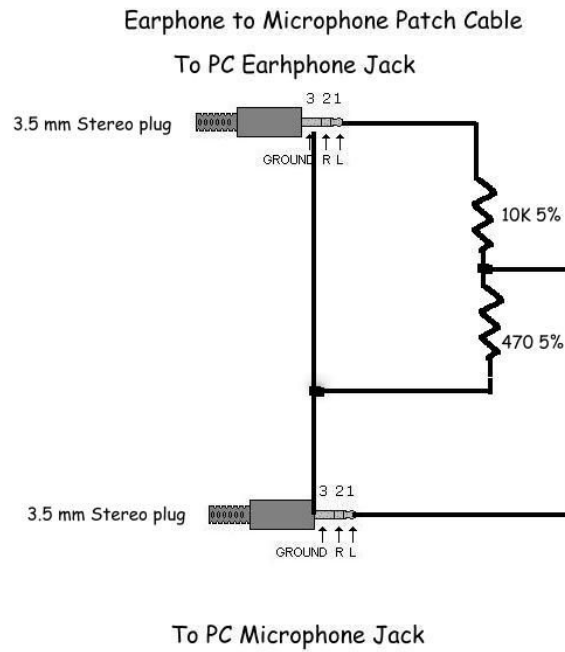
iNet2X10+ User Guide
Version 1.00

PC Windows Setup

The viewing and control PC requires as a minimum Windows XP with Internet Explorer 7 or higher. Install the iNet2X10+ X10 Control Program.

The installed graphic user interface should appear as below:
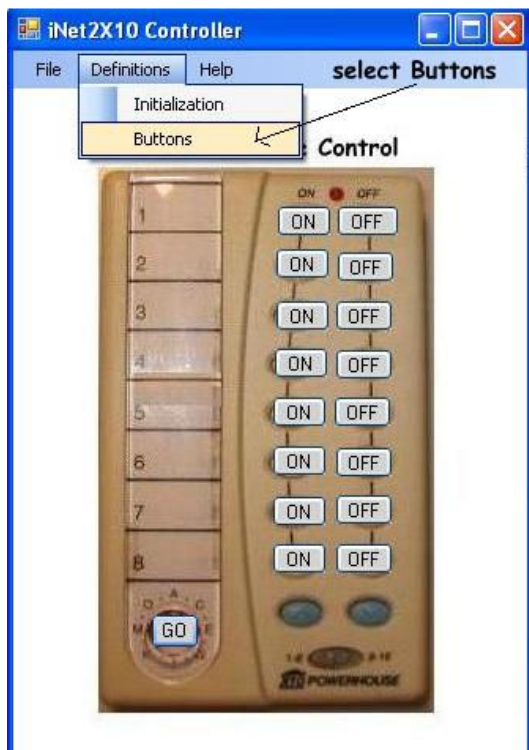
iNet2X10+ User Guide
Version 1.00

To test that system is operating properly, verify that you your PC is connected to your IP Camera. The IP camera should be set so that it allows the PC's audio to be played thru its output. The audio buffer of the IP camera should be set to the 1 second. These settings are located in the built in web server of the IP camera .

The iNet2X10+ X10 Control Program has been setup with the default parameters that select House Code =A, Security Code=1111 and Unit Codes= 1-8. Place the cursor on the mouse and click on the GO button of the X10 Remote Control graphic users interface .The Status LED should blink indicating that iNet2X10+ is waiting for a command The Status LED should turn off and the Mode LED should turn on indicating control mode is now active. Mode LED will turn off after 5 minutes of inactivity as a security feature.

Control a X10 device by clicking the mouse on the ON or OFF graphic unit # buttons for the X10 appliance/lamp modules you have programmed.

 The iNet2X10+ X10 Control Program has been designed so that in can be easily customized for user defined operation. The iNet2X10+ module responds to commands that are sent to it as DTMF tones. The type and sequence of these tones are defined buttons on the graphic user interface.

The iNet2X10+ X10 Control Program can be programmed by the user as follows:

iNet2X10+ User Guide
Version 1.00

Window opens to define GO button which can be modified

pin no. entry, *1 to indicate pin entry
defalut pin no. 1111
to enter command

Button text label

select to add new button function

default DTMF times

output DTMF

Button Label: GO

DTMF Command: *11111#

save when done

set text Font size

define button with image file

set button size

Click on GO button

The iNet2X10+ commands to control the X10 appliance/lamp modules are described in the following section.

Commands

The iNet2X10+ has two command entry modes, normal and control. Normal commands may be entered at anytime. Control commands may be entered only after a valid PIN command has been received.

Normal Mode
Most commands in normal mode consist of a single key press. However, commands that require parameters require multiple keystrokes start with an "*" and end with a "#".   Commands *1 for PIN entry, *3 for bank change and the reset PIN commands (*91#, *911#, *91???#) are also valid in normal mode.

iNet2X10+ User Guide
Version 1.00

Normal Mode Commands

Command	Function	Comments
*	Start Command function	Start of a command
*1????	Enter control mode	Enter PIN to activate control mode
*91	Reset PIN, step 1	Reset PIN, Start Request
*911	Reset PIN , step 2	Generate key code, ModeLED blinks code
*91???	Reset PIN , step 3	Enter key code
#	Enter key	ENTER key for commands

Examples:

    1)   Enter PIN 3456, press "*13456#".

Control Mode

All commands in control mode begin with an "*" and end with a "#". Control mode is active only after a valid personal identification number (PIN) is entered. The default PIN is "1111". Control mode is aborted after 5 minutes of inactivity.

Example: Enter control mode using PIN 5432, press "*15432#".

Control Command Syntax

Syntax: *cppp..#
Where: *   =   start of command
                c   =   command
                ppp… =   command parameters
                           hh - X10 house number (see house numbering scheme below)
                           uu - X10 unit number
                           o – option
                                0 = off
                                1 = on
                                2 = dim
                                3 = bright
                           ? – other parameters
                #   =   ENTER, process command

iNet2X10+ User Guide
Version 1.00

Commands are only valid while in the control mode except for *1 and *91. *1 is for PIN entry to access control mode and *91 commands are used to reset the PIN to the default of 1111 (see PIN Reset below).

Commands begin with an '*' and end with a '#'. If a command is incorrectly entered the user may enter an '*' at any time to start over. All commands are processed after the '#' is pressed.   Invalid commands are ignored. While entering a command the Status LED will blink until the "#" is pressed. A five minute timeout will occur while in the control mode and if no commands are entered.

Control mode will revert back to normal mode after 5 minutes have elapsed without any commands.

Control Mode Commands

Command	Parameter	Function	Comments

*2? o
*2??o
	?? = unit #
	o = 0-off
	    1-on
	    2-dim
	    3-bright
		Lamp/appliance modules	Turns on or off appliances and lamp modules. Dim and bright commands are for lamp modules only. ? is a one or two digit unit number defined with configuration command 8 below.

*2hhuuo	hh = house
	uu=unit
	o = 0-off
	    1-on
	    2-dim
	    3-bright
		Lamp/appliance modules	Turns on or off appliances and lamp modules. Dim and bright commands are for lamp modules only. This command does uses the house and unit code to identify the module.

*4		Not implemented	Not implemented in this version
*5????	???? new PIN	Change PIN	
*6????	???? confirm	Confirm new PIN	Must follow *5 command
*8??hhuu	??=mod no. hh=house Uu=unit	Map a module house code and unit code to a two digit code	House and Unit set to 00 undefines the two digit code
*9		Save settings and exit	Save the current settings then exit control mode.
*90		Cancel control mode	
*0??	?? mode	Select power up mode	Not implemented in this version

Examples:

1) Change PIN to 6534, press "*56534#, then press "*66545#".
2) Turn on module at house "B", unit 3, press "*202031#". If the module was previous defined as module 3, press "*231#".

Status LEDs

Two status LEDs are provided to indicate the state of iNet2X10+ hardware and firmware. The LEDs are not needed under normal operating conditions. However, the LEDs can be observed for diagnostics and must be visible while resetting the PIN to the default value.

iNet2X10+ User Guide
Version 1.00

Power on Startup
Mode LED and Status LED blinks once.

Normal Mode
Mode LED – off

Status LED – off

Control Mode
Mode LED – on when control mode active, off – normal operating mode

Status LED – blinks while waiting for command parameters

Reset PIN to Default
Mode LED – blinks key code during reset pin sequence (see Personal Identification Number, Reset PIN).

Status LED - off

Defining iNet2X10+ Modules
X10 devices are addressed using a house letter and unit number. House letters range from "A" through "P" and unit numbers range from 1 through 16. The combination of a house letter and unit number uniquely identifies an X10 device.   Since most keypads are unable to generate all 16 DTMF signals X10 house letters are mapped to a number (see House Numbering table below). iNet2X10+ defines an X10 device using a two digit house number and a two digit unit number. The maximum number of X10 devices is 256 (16 X 16). However, most home automation projects will not require that many devices. To reduce the complexity and number of keystrokes required to control your X10 devices a two digit code can be assigned to identify each device. Command "*7" and "*8" map the X10 house and unit address to a corresponding two digit code. X10 modules device do not need to be mapped to be accessible. They may be addressed using command "*2" which requires parameters to specify a house and unit code.

Examples:

1) Define the X10 module at address house "B", unit 10 to iNet2X10+ module identifier 12, press "*8120210#". When done with all definitions, press "*9#" to save or "*90#" to abort.
2) Turn on the module assigned to iNet2X10+ identifier 12, press "*2121#".
3) Turn off the module assigned to iNet2X10+ identifier 5, press "*250#" (note two digits are not necessary for the iNet2X10+ identifier).
4) Define the X10 camera at address house "K", unit M to identifier 5, press "*7051113#". When done with all definitions, press "*9#" to save or "*90#" to abort.

House Numbering

House	Number
A	01
B	02
C	03
D	04
E	05
F	06
G	07
H	08
I	09
J	10
K	11
L	12
M	13
N	14
O	15
P	16

Default Module Settings

The default settings define 8 modules in house A. All other cameras and modules are undefined with house and unit value of 00.

Module Default Settings

Mod	House	Unit
1	A	1
2	A	2
3	A	3
4	A	4
5	A	5
6	A	6
7	A	7
8	A	8

Camera Default Settings

CAM	House	Unit
1	A	9
2	A	10
3	A	11
4	A	12
5	A	13
6	A	14
7	A	15
8	A	16

iNet2X10+ User Guide
Version 1.00

Personal Identification Number

Control mode commands can only be executed after a valid personal identification number (PIN) has been entered with the "*1" command.   This PIN is used to help prevent unauthorized access to your X10 modules. Control mode is automatically aborted after 5 minutes of inactivity.

Changing Your PIN

The default PIN is set to 1111, to change it use the following sequence. Remember you must be in control mode to change your PIN. Or if you forgot your PIN you can reset it to the default by using the reset pin procedure described below.

1) Press "*5xxxx#", where xxxx is your new PIN.
2) Press "*6xxxx#", this confirms your new PIN. This command must immediately follow the "*5" command.
3) Press "*9" to save changes.

PIN Reset

The following command sequence will reset the PIN to the default value of 1111.

1) Enter *91# to begin the PIN reset sequence.
2) Enter *911# to generate a key.
3) Observe the Mode LED. The Mode LED will blink a 3 digit code, each digit can have a value of 1 to 5.
4) Enter *91???# , where ??? is the three digit code.

Power-Up Initialization

Upon applying power to the iNet2X10+ device the microcontroller executes the follow initialization sequence.

1) Initialize hardware
2) Blink both LEDs once
3) Read the configuration memory
4) Turn off all defined cameras
5) Select camera Bank 1
6) Turn on camera 1

Turning off all define CAMs can take several seconds. Approximately one second is required for each defined CAM.

iNet2X10+ User Guide
Version 1.00

Specifications

Size: 2.373"W X 3.515"L X .900"H

Power: 6V – 9V DC, approximately 70 mA

                1.3mm I.D. x 3.5mm O.D. x 9.5mm Female plug

 USB: Type A, USB 2.0

Audio: 3.50mm Headphone, mini plug

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iNet2X10+ User Guide
Version 1.00

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