

# iNet2X10 User Guide

Version 1.01



Tri-L Data Systems, Inc.

# iNet2X10 User Guide

Version 1.00

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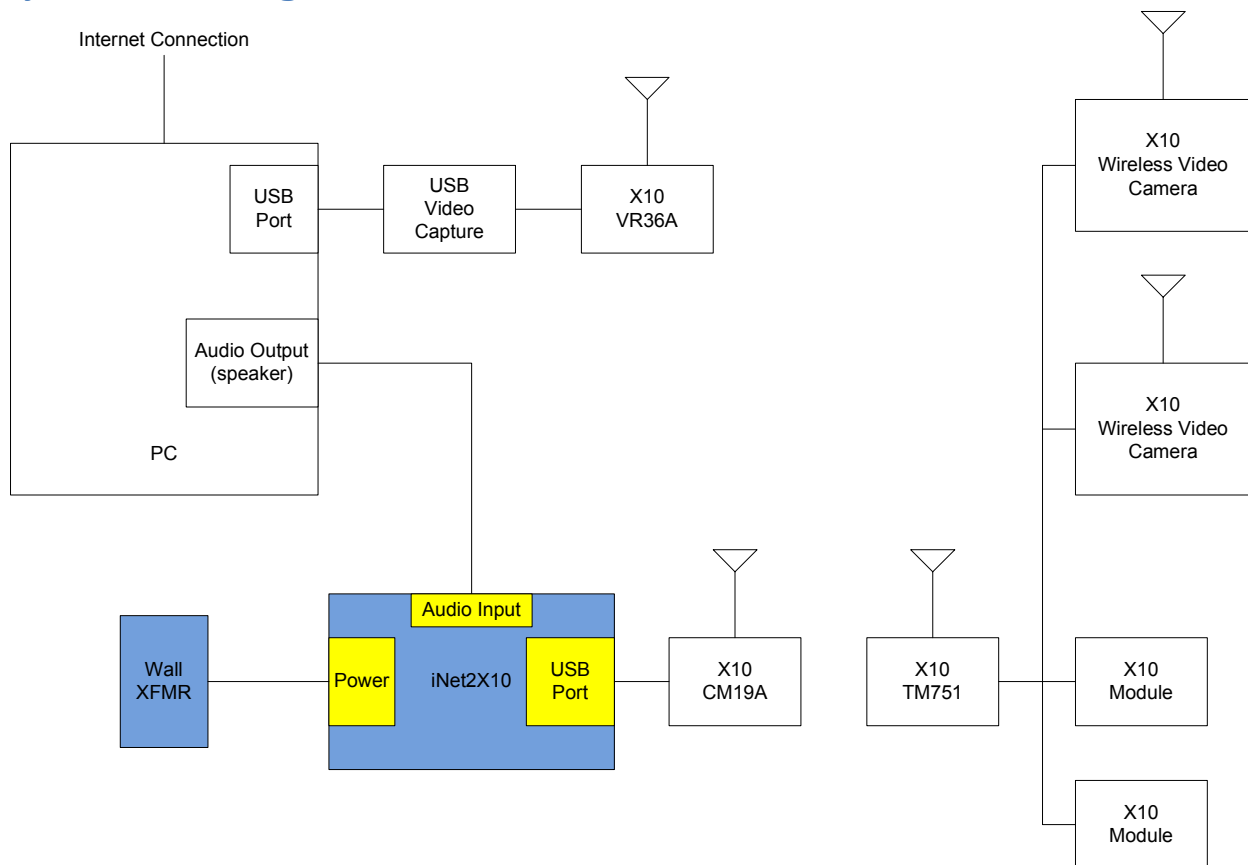
## Introduction

Today, X10 technology is readily available, affordable and in wide use for home automation. This document describes iNet2X10, 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. No special program, router settings, dedicated IP addresses and/or paid services are necessary. User configuration allows the iNet2X10 to control up to 64 video cameras and 64 modules for a total of 128 devices. 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 Microchip™ PIC programming tools.

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

## System Block Diagram



The above block diagram illustrates the integration of an iNet2X10 device with standard X10 components and a personal computer to enable remote access and control via the Internet.

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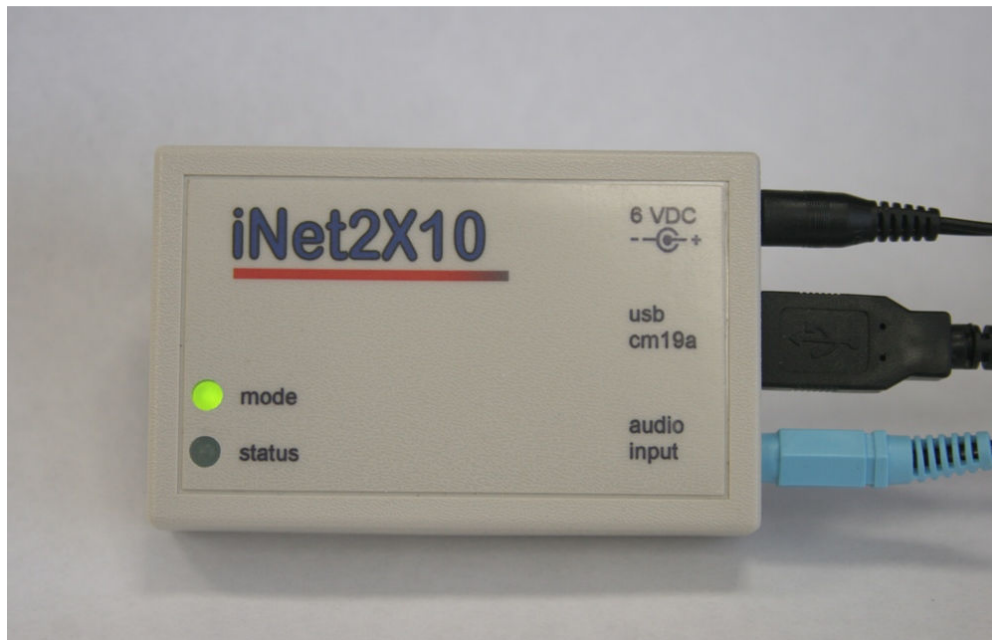
## Setup

This document only describes setup and installation of the iNet2X10 device. For other devices, please refer to the instructions provided with the purchase of your X10 components.

## Install and Configure X10 Devices

Install your X10 transceivers, video converter, video cameras and other 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 cameras and modules, please be sure to configure your X10 devices to match the default settings. If you have many cameras and/or 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 PC speaker output jack.
- 3) Insert the wall mount transformer into a power source. Insert the power plug in the iNet2X10 power jack. Both LEDs should blink once.
- 4) Define your X10 devices if necessary. If you are using the default settings skip this step. Otherwise see Defining iNet2X10 Cameras and Modules for instructions.

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## Personal Computer Setup and Testing

- 1) Two computer systems are required to do remote video monitoring and control. The PC which is located on the remote site you want to monitor and control will have the iNet2X10 module connected to it along with the X10 modules and cameras you selected. The PC used to view and control the remote PC only needs to have Skype™ or Windows Live Messenger running on it.
- 2) Using Skype™ is preferred because of its built-in DTMF dial pad and ability to do automatic answer for incoming calls.
- 3) If you wish to use Windows Live Messenger on the remote monitoring PC, you will need to install Messenger Plus. Messenger Plus will allow Windows Live Messenger to auto accept incoming calls. You can download Messenger Plus from here:  
<http://www.msgplus.net/>
- 4) If you are using Windows Live Messenger, the PC used to view and control the remote PC will need a earphone to microphone patch cable. Windows Live Messenger does not presently have a built in DTMF dial pad. You need to download and install a DTMF generator program. The following links are examples of two free DTMF generators (Skype™ includes a DTMF generator). You should also install one of the DTMF generator programs on the PC that will be used for remote video monitoring, it will be used for the initial setup and testing of the iNet2X10 module.

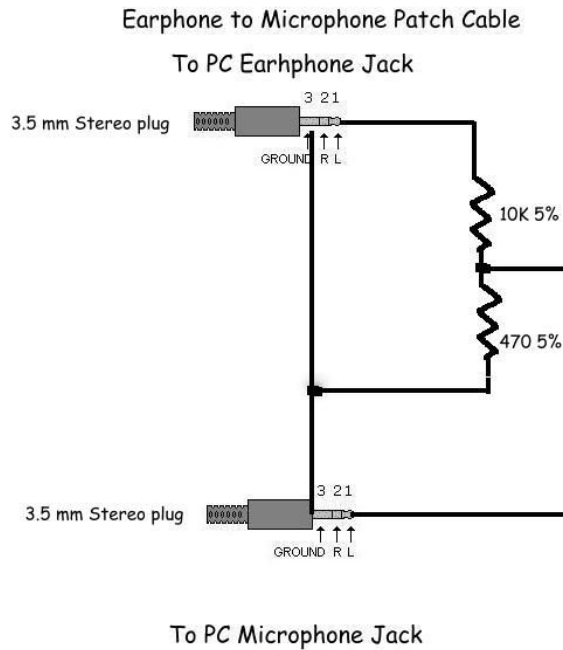
<http://www.filetransit.com/download.php?id=24773>

<http://www.polar-electric.com/DTMF/>

You can purchase the earphone to microphone patch cord from Tri-L Data Systems or build your own, see the patch cable diagram below.

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- 5) To test the PC that will be used for remote video monitoring and control, start your DTMF generator program. Press the “\*” key. The Status LED should blink indicating that iNet2X10 is waiting for a command entry to be completed. Press “11111#” to enter into control mode. The Status LED should turn off after the “#” key is pressed and the Mode LED should turn on indicating control mode is now active.
- 6) Turn on or off an X10 device. Example, if you have an appliance module set to house “A”, unit 5, press “\*201051#” to turn it on, or “\*201050#” to turn it off.
- 7) If you do not have Skype™ or another video conferencing application on your PC, you’ll need to install it now. After you are done, connect to your PC and test your iNet2X10 with commands similar to those in step (2) and (3).
- 8) The video source for your Skype™ or Windows Live Messenger video chat program can be what is appropriate for your application. The sources can be the following:
  - A) You can use a USB webcam camera of your choice that is compatible with your video chat program. If you wish to pan & tilt the camera you will need to purchase the X10 VK75A-C pan and tilt base which includes the XM14A power supply . If you plan to use a high resolution webcam, make sure that your internet connection can support the higher bandwidth requirements.
  - B) You can choose a variety of video cameras from [www.x10.com](http://www.x10.com) . It is sometimes more cost effective to purchase a bundled package from X10.com than purchasing the items separately even if the bundle includes items that may not be needed. The XCam PRO Daylight/Low-Light Camera (XX32A) is a good choice. The XC18A video camera has very poor

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- image quality and is not recommended by Tri-L Data Systems. Video cameras like those from X10 output composite video which is analog. To convert the analog video to a digital form that can be connected to the PC via the USB port, a video capture cable is required. The X10 VA12A video capture adapter is not compatible with Skype™ or Windows Live Messengers and appears to only work with the X10 software. The Diamond AC500 video capture cable has been tested to work with Skype™ and Windows Live Messenger. Tri-L Data Systems is in the process of testing other USB video capture hardware to verify compatibility with Skype™ or Windows Live Messenger. The results will be posted on the website when they are available. The cameras can be mounted in a fixed position but if you want to be able to pan and tilt the camera you will need to purchase the X10 VK75A-C pan and tilt base. Be aware that the wireless video cameras use the 2.4 GHz band. Avoid mounting a wireless video camera or video receiver too close to a WI-FI router because of possible video interference problems.
- C) If you experience too much video interference in 2.4GHz, there are wireless video cameras that operate in the 900 Mhz range that maybe a better choice for your application. The best quality and most reliable image is provided by using a hard wired video system. This involves more work to connect the wires but this may be appropriate for your application.

## Keypad Layout

The diagram below illustrates the relative position of keys used to control your camera's pan and tilt. Also shown are keys used to select different cameras and the commands keys.

1  Camera 1	2 ABC  <b>UP</b>	3 DEF  Camera 2
4 GHI  <b>LEFT</b>	5 JKL  <b>STOP</b>	6 MNO  <b>RIGHT</b>
7 PQRS  Camera 3	8 TUV  <b>DOWN</b>	9 WXYZ  Camera 4
*  COMMAND	0  Not Defined	#  ENTER



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## Commands

Commands are sent to the iNet2X10 via your PC's speaker output jack. The tones received are decoded and translated into commands to control your X10 devices. 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 that 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.

### Normal Mode Commands

Command	Function	Comments
1	Camera 1	Selects camera 1,5,9, or 13
2	UP	
3	Camera 2	Selects camera 2,6,10, or 14, based on bank
4	LEFT	
5	STOP	
6	RIGHT	
7	Camera 3	Selects camera 3,7,11, or 15
8	DOWN	
9	Camera 4	Selects camera 4,8,12, or 16
0	not defined	
*	Start Command function	Start of a command
*1????	Enter control mode	Enter PIN to activate control mode
*3b *3bb	Change camera bank	b is the one or two digit bank code from 1 to 16.
*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) Pan camera left, press "4". To stop panning, press any other key.
- 2) Select camera 3 in the current bank, press "7".
- 3) Change camera bank to bank 4 press "\*34#".
- 4) Enter PIN 3456, press "\*13456#".

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## 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:

- 1) 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

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).

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.

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*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
*7??hhuu	?? = cam no. hh= house uu=unit	Map camera house code and unit code to a two digit code	House and Unit 00 undefines the two digit code
*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 previously 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.

## 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

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## Reset PIN to Default

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

Status LED - off

## Camera Selection

Cameras are accessible in groups of four using keys 1, 3, 7 and 9. Banks are changed using the “\*3” command. Each camera is defined using the command “\*7??hhuu”, where ?? is the camera number, hh is the house number, and uu is the unit number. 64 cameras may be defined and selected by bank number and key. Undefined cameras have an hhuu value of 0000. See Defining iNet2X10 Cameras and Modules for an explanation of defining X10 cameras and modules.

### Camera Selection by Bank and Key

Bank	1 key	3 key	7 key	8 key
1	01	02	03	04
2	05	06	07	08
3	09	10	11	12
4	13	14	15	16
5	17	18	19	20
6	21	22	23	24
7	25	26	27	28
8	29	30	31	32
9	33	34	35	36
10	37	38	39	40
11	41	42	43	44
12	45	46	47	48
13	49	50	51	52
14	53	54	55	56
15	57	58	59	60
16	61	62	63	64

## Defining iNet2X10 Cameras and 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. The current version of the firmware allows up to 64 CAMS

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and 64 modules to be defined using this scheme. X10 module devices 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. However, cameras should be defined since it greatly reduces the number of key strokes necessary for control and to enable pan and tilt operation.

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.
- 5) View camera 05, press “1” if already in bank 2, if not press “\*32#” to select bank 2, then press “1”.

## 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

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## Default Camera and Module Settings

The default settings define 8 cameras and 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

## 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. If you forget your PIN, you can reset it to the default by using the reset pin procedure described below.

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

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## 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 defined CAMs can take several seconds. Approximately one second is required for each defined CAM.

## 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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This product is sold as a component and is not certified by any agency. Use in applications or as a subassembly in products that require certification is the responsibility of the user.



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## Warranty

This Warranty shall be in lieu of any other warranty, express or implied. Implied warranties of merchantability and fitness for a particular purpose are limited in duration to 60 days from the date of purchase. The sole damages to which a purchaser or user of the iNet2X10 component may seek or recover from the manufacture, is the purchase price paid by the purchaser or user of the iNet2X10 component for the product. This Warranty shall NOT apply and is terminated when any product contained in this document or any part thereof has been subjected to accident, alteration, abuse, and misuse, or where incompatible parts are used.

Note: Some states do not allow limitations on how long an implied warranty lasts, or the exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Any representations or promises inconsistent with or in addition to this Warranty are unauthorized and shall not be binding on iNet2X10's manufacturer.

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