TRENDNET®

User's Guide

TPL-401E
TPL-401E2K
1.01

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Chapter 1: Product Overview

The TPL-401E / TPL-401E2K is an excellent solution that can be used to extend your network using your home or small office electrical wiring. In a home or small office building, use 500Mbps Powerline AV adapters to link multiple locations without the need to run long Ethernet cables. Combined with a single broadband DSL/Cable Internet connection, every room with electrical power outlets can provide easy access to your high-speed Internet connection. With HomePlug® AV speeds of up to 500Mbps, this easy-to-setup solution can provide fast streaming HD movies, online multiplayer games, and other data intensive applications for today's HD Entertainment Center demand.

Each TPL-401E 500Mbps Powerline AV Adapter allows you to connect one network enabled device to a powerline network via Ethernet. In operation, the 500Mbps Powerline AV Adapter is completely transparent, and simply passes data between the Ethernet port and the powerline network. Any Ethernet-enabled device may be connected to the 10/100/1000Mbps Auto-MDIX Gigabit Ethernet port.

1.1   Powerline Network Solution

Add high-speed Internet access to any room in your home with this 500Mbps Powerline AV Adapter. You can stream HD movies and music, play online multi-player games and much more.

Note: This TPL-401E 500Mbps Powerline AV Adapter needs to pair with at least one other IEEE 1901 or HomePlug® AV compatible powerline device. (e.g. TRENDnet Powerline AV products TPL-305E, TPL-303E, TPL-304E, TPL-310AP, or another TPL-401E). The TPL-401E2K 500Mbps Powerline AV Adapter Kit already includes two TPL-401E adapters, therefore, there is no requirement for an additional powerline adapter.

1.2   Package Contents

The product package should contain the following items:

TPL-401E 500Mbps Powerline AV Adapter

- TPL-401E
- Multi-Language Quick Installation Guide
- CD-ROM (Utility & User's Guide)
- Cat. 5 Ethernet Cable (1.5 m / 5 ft.)

TPL-401E2K 500Mbps Powerline AV Adapter Kit

- 2 x TPL-401E
- Multi-Language Quick Installation Guide
- CD-ROM (Utility & User's Guide)
- 2 x Cat. 5 Ethernet Cables (1.5 m / 5 ft.)

If any of the parts are incorrect, missing, or damaged, contact your dealer. Keep the carton, including the original packaging materials, in case you need to return the Powerline adapter for repair.

1.3   System Requirements

- CD-ROM drive
- A Desktop or Laptop PC with Network Adapter Installed
- Existing 10/100Mbps wired network when TPL-401E is used as a bridge device
- Additional HomePlug® AV or IEEE 1901 compliant powerline adapter
  Note: Requirement for TPL-401E only, (e.g. TRENDnet TPL-303E, TPL-304E, TPL-310AP, TPL-305E, or another TPL-401E) The TPL-401E2K already includes two TPL-401E adapters.

Powerline Configuration Utility System Requirements

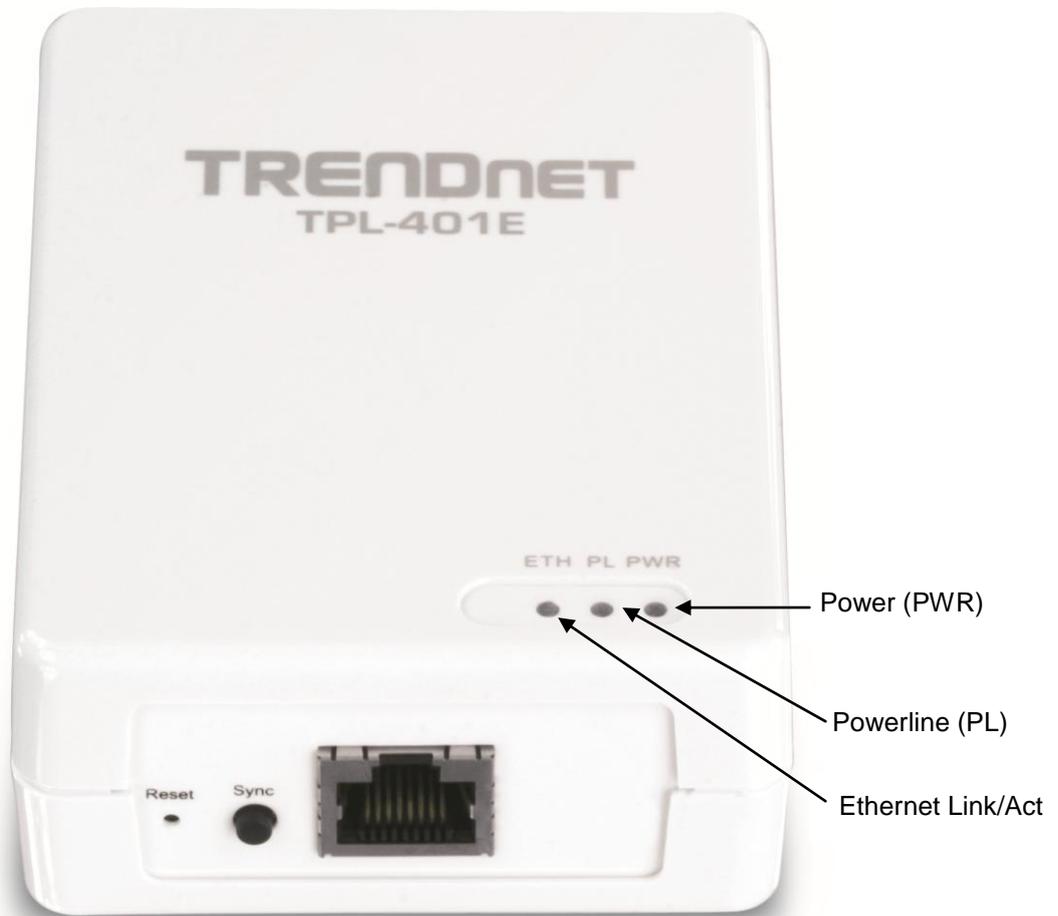| Supported Operating Systems	CPU	Memory
Windows 7 (32/64-bit)	1GHz or above	1GB RAM or above
Windows Vista (32/64-bit)	800MHz or above	512MB RAM or above
Windows XP (32/64-bit)	300MHz or above	256MB RAM or above

1.4   Device Label

The device label can be located on the back of the device where the power prong is found.

Product Model ⟶ MODEL NO:
Device Serial Number ⟶ S/N:

Device MAC Address ⟶ MAC:
Device Password (DPW) ⟶ DPW: VARS-ECHE-SAGA-OWED
Product Hardware Version ⟶ H/W: V1.0R
Product Firmware Version ⟶ F/W:
This device complies with Part 15 of FCC Rules.
Made in China

1.5 LEDs

The LED panel located on the front of the device consists of the status LEDs: Power (PWR), Powerline (PL), and Ethernet Link/Act (ETH).
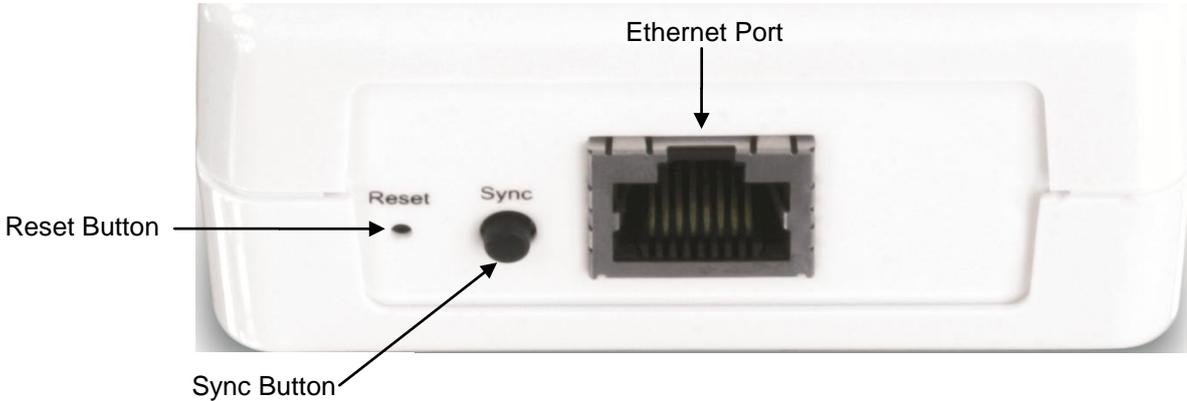

LED	Color	Sequence	Definition
PWR (Power)	**Green**	**Solid**	Device powered On
	N/A	**Off**	Device powered Off
PL (Powerline) **Note:** LED color indicates the strength and quality of the powerline connection through the electrical system	**Green**	**Solid**	Powerline Connected (Connection Quality is Best)
		Blinking	Syncing or Powerline Data Transmitting/Receiving (Connection Quality is Best)
	Amber	**Solid**	Powerline Connected (Connection Quality is Better)
		Blinking	Powerline Data Transmitting/Receiving (Connection Quality is Better)
	Red	**Solid**	Powerline Connected (Connection Quality is Good)
		Blinking	Powerline Data Transmitting/Receiving (Connection Quality is Good)
	N/A	**Off**	Powerline is not synced or connected
ETH (Ethernet Port)	**Green**	**Solid**	10/20 Mbps, 100/200Mbps, or 1000/2000Mbps (Half/Full Duplex) Connected
		Blinking	10/20Mbps, 100/200Mbps, or 1000/2000Mbps (Half/Full Duplex) Data Transmitting/Receiving
	N/A	**Off**	Port Disconnected/No Ethernet Link

*Note: The following factors may affect the powerline network's connection quality:

- Noise – Generated by appliances that are connected to your electrical system through power outlets that have high power consumption requirements. (e.g. Microwaves, ovens, blow dryer, iron, dishwasher, etc.) The quality of your household electrical wiring may also cause additional noise on your electrical system.
- Distance – Long lengths of electrical wiring through your electrical system between connected powerline adapters.

1.6 Ethernet Port

There is one RJ-45 10/100/1000Mbps Auto-MDIX Gigabit Ethernet port, Reset Button, and Sync Button located at the bottom of the device.

Ethernet Port

Reset Button

Sync Button

Button	Action	Function
Sync	Push/Hold for 2 sec	Initiate Sync/Connection and generate random network name/key on first adapter (PWR LED will start blinking)
		Match network name/key on secondary or additional adapter and connect to first adapter. (PWR LED will start blinking)
		Note: The secondary or additional powerline adapter's Sync button must also be pushed within 2 minutes (120 sec) of pushing the Sync button of the first adapter in order to establish connectivity.
	Push/Hold for 10 sec	Erases the network name/key (All LEDs will turn off and turn back on)
Reset	Push/Hold for 1 sec	Reset device to factory defaults (All LEDs will turn off and turn back on) Note: Will reset to the factory default private network name "HomePlugAV"

Chapter 2: Product Installation

At factory default settings, a pair of TPL-401E 500Mbps Powerline AV adapters (or TPL-401E2K) can be installed into any room in your home or small office with a wall power outlet, without the need for additional software or configuration. To create a simple powerline network using a pair TPL-401E powerline adapters, simply plug one of your TPL-401E adapters into a wall power outlet in one room and plug the other TPL-401E adapter into an available wall power outlet in another room to establish connectivity between the two rooms.

In order to share Internet connectivity through your powerline adapters, it is ideal to install at least one powerline adapter in the room where your modem and router are located and connect the powerline adapter to one of your router's LAN ports via Ethernet. Any additional powerline adapters that are installed and connected in other rooms will then share Internet connectivity through your router. Once the powerline adapters are connected to each other through the electrical system, any additional devices such as computers or network appliances (e.g. Game Console, Blu-ray player, IP Set Top Box, network enabled TV, etc.) connected to any of your powerline adapters via Ethernet can then communicate to each other as well as share Internet connectivity through your router.
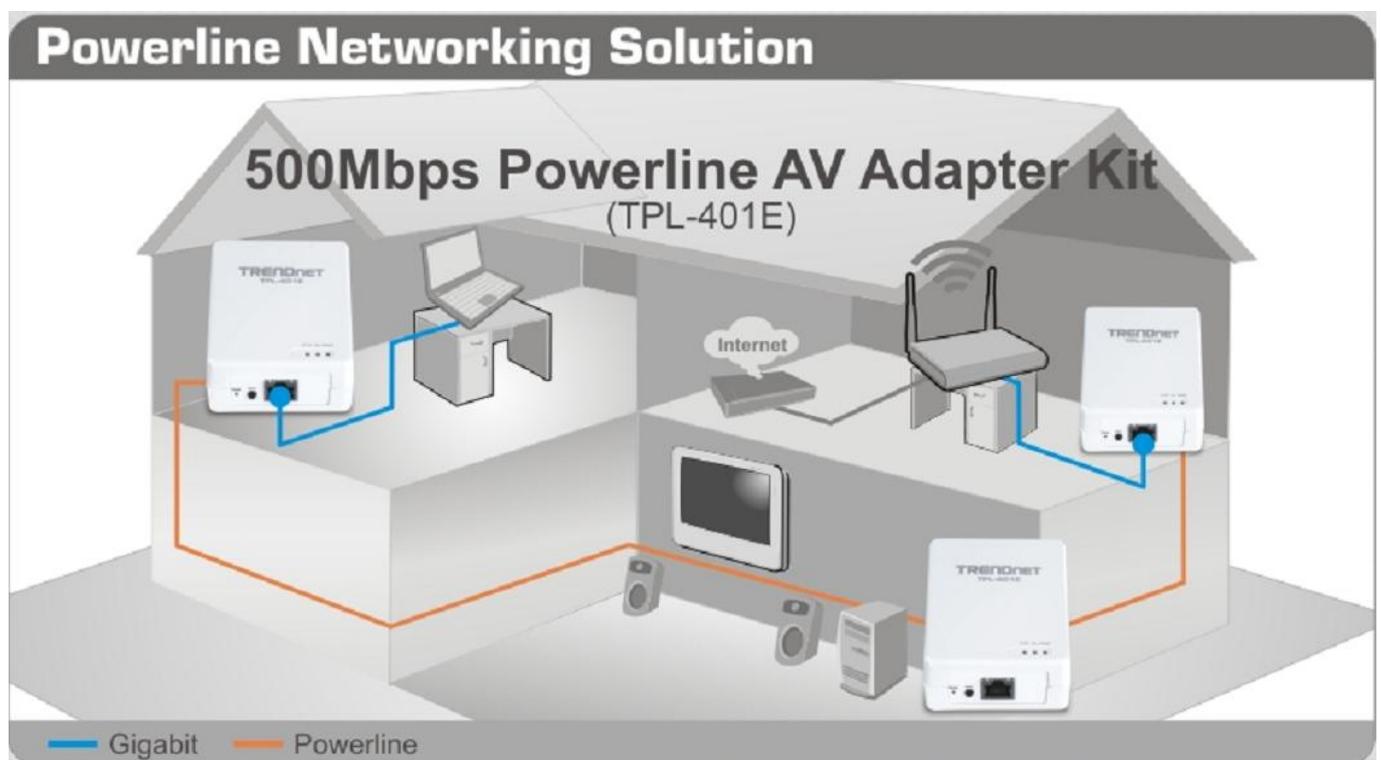
The example diagram shows a typical powerline network configuration in a home environment with 3 powerline adapters installed in different rooms. The orange line represents the powerline connectivity established through your home's electrical system and the blue lines represent Cat. 5, 5e, 6 Ethernet connectivity to your network enabled appliances such as a computer, router, or IP set top box connected to your television.

2.1 Initial Installation

The procedure describes how to create a basic powerline network between a pair of TPL-401E powerline adapters and share Internet connection through a router to a computer or network appliance in another room.

Assuming your router is already installed and configured for Internet connectivity and the TPL-401E powerline adapters are at factory default settings.

1. Plug one of the TPL-401E powerline adapters into an available wall power outlet in the room where your router is located.

    Warning: Do not plug the powerline adapter into a power strip that has surge protection. Doing so will degrade power line performance. For best performance, plug all powerline adapters directly into a wall power outlet.

2. Connect one end of the Ethernet Cable into the Ethernet port located at the bottom of the TPL-401E and connect the other end of the Ethernet cable into one of the router's LAN ports.

3. Plug the second TPL-401E powerline adapter into an available wall power outlet in another room where your computer or network appliance (e.g. Game Console, Blu-ray player, IP Set Top Box, network enabled TV, etc.) is located.

4. Connect one end of the Ethernet Cable into the Ethernet port located at the bottom of the second TPL-401E and the other end of the Ethernet cable into the Ethernet port on your computer or network appliance (e.g. Game Console, Blu-ray player, IP Set Top Box, network enabled TV, etc.).

5. To verify connectivity between the TPL-401E powerline adapters, make sure that the PL LED on each TPL-401E is on solid (Green, Amber, Red). Please refer to the LED section 1.5 for details on the LED indicator.

6. You have successfully created a basic powerline network between a pair of TPL-401E powerline adapters. The computer or network appliance connected to the second powerline adapter via Ethernet can now access the Internet.
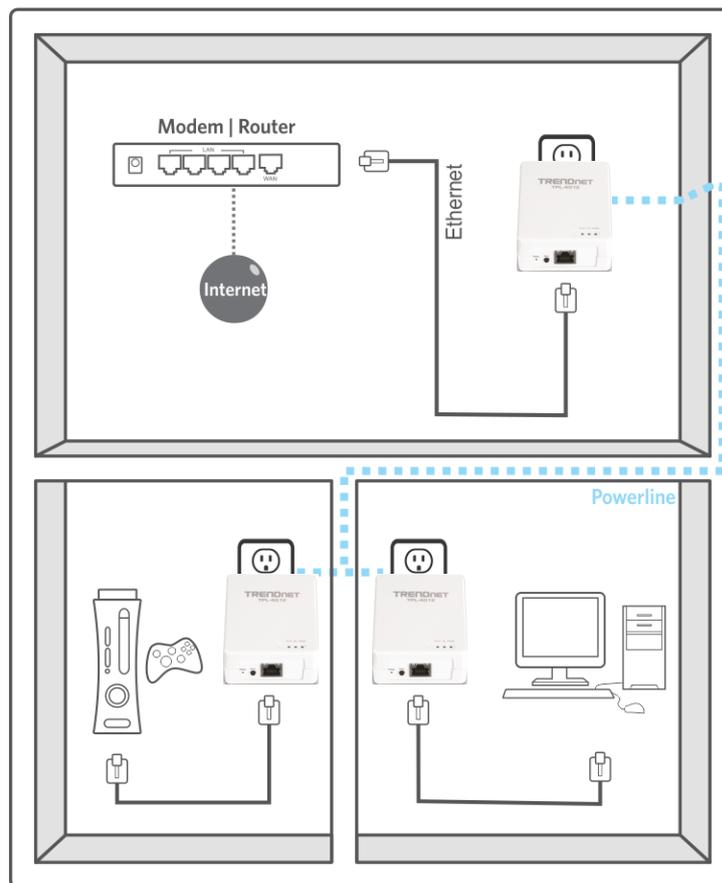
2.2 Securing your Powerline Network

The TPL-401E 500Mbps Powerline AV Adapter has a default network name/security key assignment of "HomePlugAV". When connecting a pair of TPL-401E powerline adapters, both powerline adapters will be assigned the default network/security key which allows the TPL-401E powerline adapters to establish connectivity through your home or small office's electrical system without the need for additional software or configuration. For added security, the default network name/security key can be modified using the TPL-401E Sync button covered in the following section or through the use of the Powerline Configuration Utility in Chapter 4.

Note: The default network name/security key assigned to the TPL-401E is "HomePlugAV". All powerline adapters in the same powerline network must have the same network name/security key in order to establish connectivity. . If the network name/security keys are not the same for all powerline adapters on the same powerline network, the adapter will NOT establish connectivity. TRENDnet Powerline AV models TPL-303E, TPL-304E, TPL-305E, TPL-310AP, and TPL-401E all have the same default network name/security key assignment of "HomePlugAV".

2.3 Changing the Network Name/Security Key using the Sync Button

The procedure describes how to create a change the network name/security key between a pair of TPL-401E powerline adapters. This procedure can also be used to establish connectivity between two powerline adapters that are currently disconnected and change the default network name/security key simultaneously.
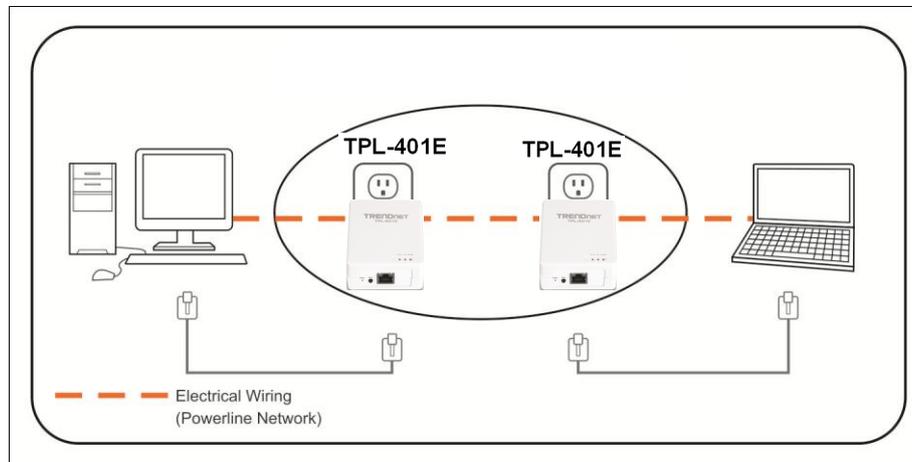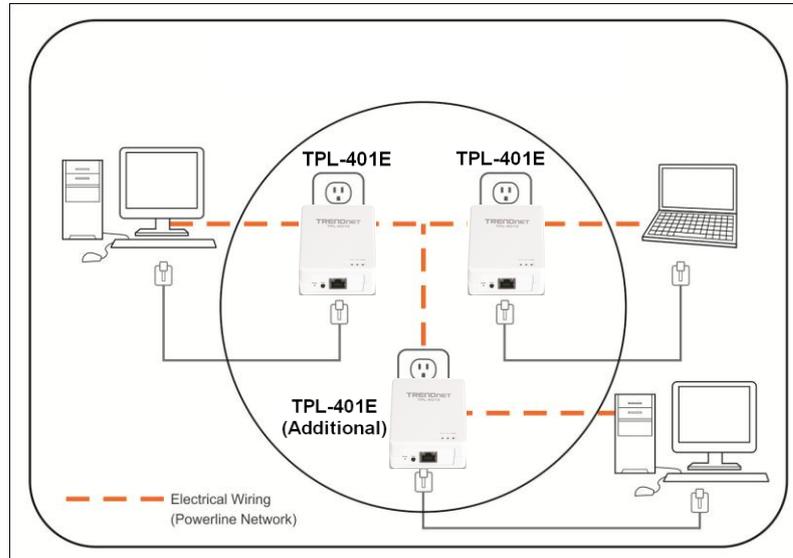

Assuming your TPL-401E powerline adapters are already plugged into wall power outlets and either currently connected or disconnected to each other.

1. Push and hold the Sync button on one of the TPL-401E powerline adapters for 10 seconds and release it. All LEDs will turn off and turn back on. This will erase the current network name/security key assigned to the first powerline adapter.

2. Push and hold the Sync button on the other TPL-401E powerline adapter for 10 seconds and release it. All LEDs will turn off and turn back on. This will erase the current network name/security key assigned to the second powerline adapter.

3. Push and hold the Sync button on the first TPL-401E powerline adapter for 2 seconds and release it. The PWR LED will start blinking. This will initiate sync/connection and generate a random network name/security key assignment to the first adapter.

4. Within 2 minutes (120 sec), push and hold the Sync button on the second TPL-401E powerline adapter for 2 seconds and release it. The PWR LED will start blinking. This will establish connectivity between the two powerline adapters by assigning the second powerline adapter's network name/security key to match the network name/security key of the first powerline adapter.

5. To verify connectivity between the two powerline adapters, make sure that the PL LED on each powerline adapter is on solid (Green, Amber, Red). Please refer to the LED section 1.5 for details on the LED indicator.

2.4 Adding the Powerline Adapter to an Existing Powerline Network

The procedure describes how to add the TPL-401E 500Mbps Powerline AV Adapter to an existing powerline network.

Assuming the two TPL-401E powerline adapters are currently connected to each other and the third TPL-401E (Additional) powerline adapter is currently disconnected.

1. Push and hold the Sync button on the additional TPL-401E powerline adapter for 10 seconds and release it. All LEDs will turn off and turn back on. This will erase the current network name/security key assigned to the additional TPL-401E powerline adapter.

2. Push and hold the Sync button on one of the two TPL-401E powerline adapters that are currently connected to each other for 2 seconds and release it. The PWR LED will start blinking.

3. Within 2 minutes (120 sec), push and hold the Sync button on the additional TPL-401E for 2 seconds and release it. The PWR LED will start blinking. This will establish connectivity between the three powerline adapters by assigning the additional TPL-401E powerline adapter's network name/security key to match the network name/security key of the TPL-401E powerline adapters that are currently connected.

4. To verify connectivity between the three powerline adapters, make sure that the PL LED on each powerline adapter is on solid (Green, Amber, Red). Please refer to the LED section 1.5 for details on the LED indicator.

Chapter 3: Overlapping Powerline Networks

It is possible to create multiple powerline networks on the same electrical system separated and grouped by different network names/security keys. The powerline networks will work and communicate independently of each other which can provide security between different groups of powerline adapters. For example, if you have five powerline adapters (Adapter A, Adapter B, Adapter C, Adapter D, Adapter E), you can group Adapters A,B, and C together on one powerline network and group Adapters D and E on a different powerline network. Each group will use a different network name/security key.

Note: It is recommended that only a maximum of up to 4 powerline networks can be created per electrical system. Any additional powerline networks above the recommended result in significant degradation in powerline performance.

3.1 Move Powerline Adapters between different Powerline Networks

Use the procedures in Chapter 2: Product Installation, to connect one group of adapters, then you can carry out the procedures on another group of adapters to create multiple overlapping powerline networks. This procedure describes how to disconnect a powerline adapter from one powerline network and connect the adapter to a different powerline network.
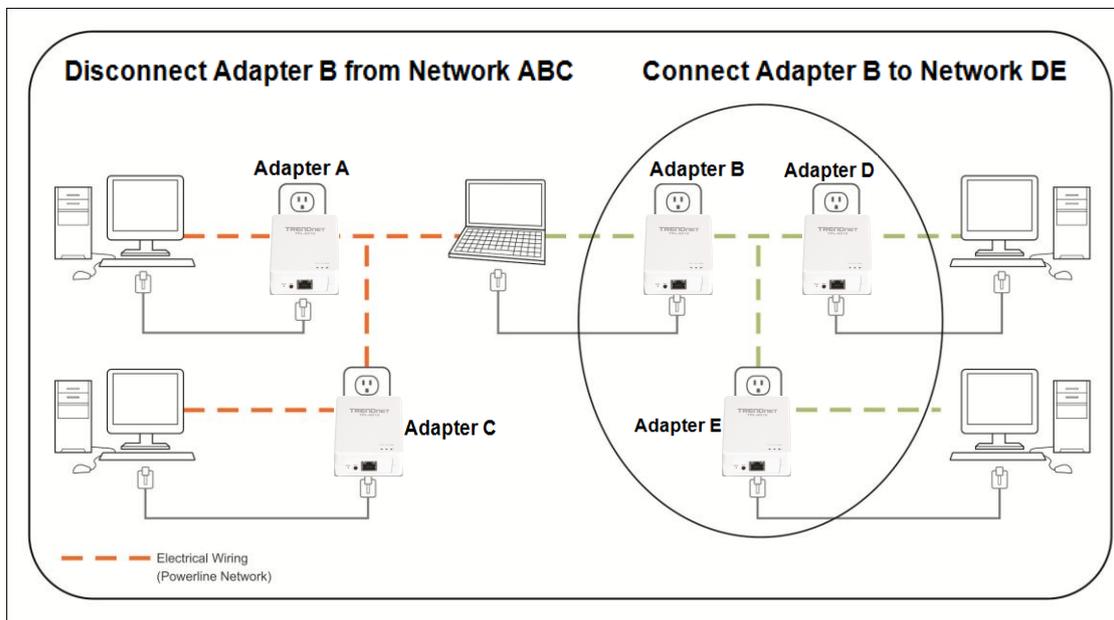
Assuming all powerline adapters are TPL-401E adapters and for reference in the diagram and this procedure, the adapters will be labeled *Adapter A, B, C, D,* and *E. Adapters A, B,* and *C* are currently connect together to form one powerline network and *Adapters D* and *E* form another powerline network. *Adapter B* will be disconnected from *Adapters A* and *C* and connected to *Adapters D* and *E.*

1. Push and hold the Sync button on *Adapter B* for 10 seconds and release it. All LEDs will turn off and turn back on. This will erase the current network name/security key assigned to *Adapter B* and disconnect from *Adapters A* and *C.*

2. Push and hold the Sync button on *Adapter D* for 2 seconds and release it. The PWR LED will start blinking.

3. Within 2 minutes (120 sec), push and hold the Sync button on *Adapter B* for 2 seconds and release it. The PWR LED will start blinking. This will establish connectivity between *Adapters*

B, D, and E by assigning *Adapter B's* network name/security key to match the network name/security key of *Adapters D and E.*

4. To verify connectivity between the powerline adapters, make sure that the PL LED on each powerline adapter is on solid (Green, Amber, Red). Please refer to the LED section 1.5 for details on the LED indicator.

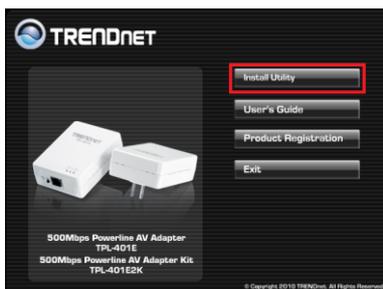# Chapter 4: Powerline Configuration Utility

The Powerline Configuration Utility is an additional tool that allows you to centrally manage the powerline adapters that are connected to your network. Instead of using a randomly generated key with the Sync button, the utility allows you to manually configure the network name/security key for a single powerline adapter or multiple adapters simultaneously. This tool allows for easy management for multiple powerline adapters in your network.

Note:
1. Before installing and using the utility, write down the 16-digit Device Password (DPW) and MAC Address of each TPL-401E powerline adapter as this will be required to apply changes to remote devices discovered in the utility. This is located on the Device Label, please refer to Section 1.4.
2. Before installing and using the utility, make sure your computer in which you are installing the utility is connected to your network and your TPL-401E adapters are also connected to your network.
3. Make sure all of the TPL-401E powerline adapters are already connected to each other using the procedures in Chapter 2: Product Installation.
4. The utility is only compatible with Windows operating systems. For details, please refer to Section 1.3.

4.1 Software Installation

1. Insert the included CD-ROM into your computer's CD-ROM drive.

2. At the CD Autorun Prompt window, click *Run Autorun.exe*

3. At the CD-ROM menu window, click *Install Utility*.

4. At the WinPcap installer window, click *Next*.
Note: The Powerline Configuration Utility requires the use of the WinPcap application. If this prompt does not appear, you may already have the WinPcap application installed. If so, please skip over to Step 9.
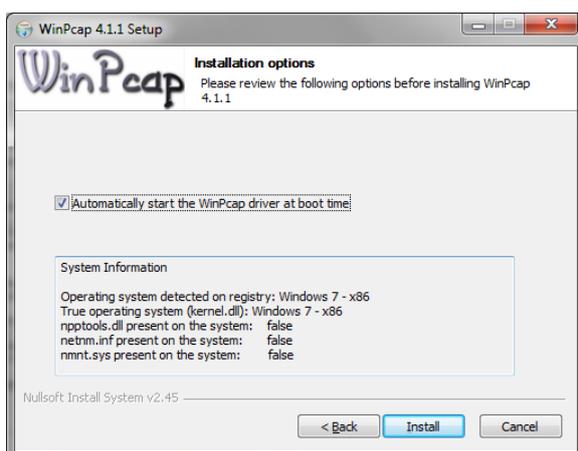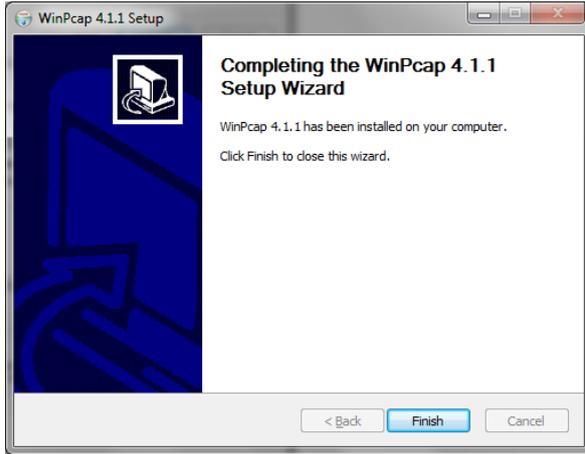
5. In the Setup Wizard window, click *Next*.

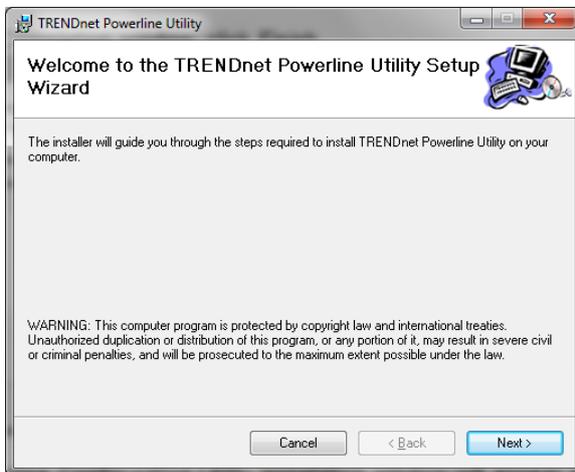6. *In the License Agreement window, click *I Agree.*

7. In the Install Options window, click Install.

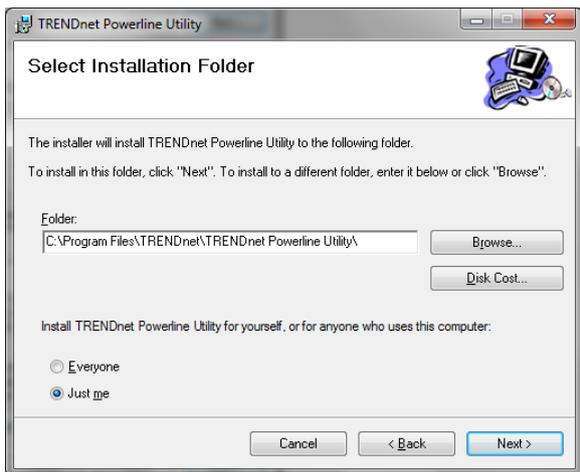8. At the Setup Wizard Completion window, click *Finish*.

9. The TRENDnet Powerline Configuration Utility installation window will appear automatically. At the Setup Wizard window, click *Next*.
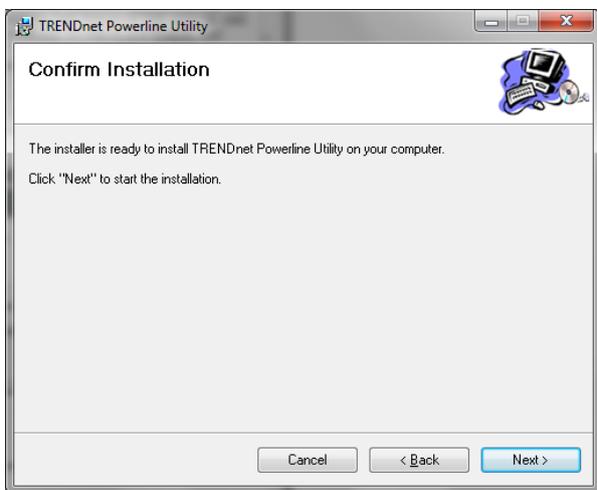

10. In the License Agreement window, check the radio button *I Agree*, and then click *Next*.
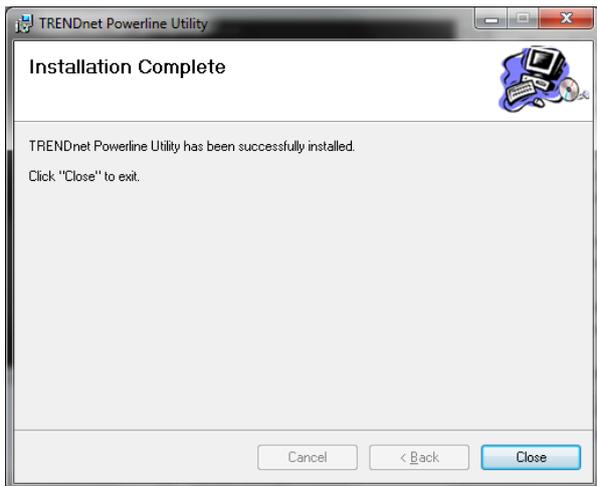
11. In the Select Installation Folder window, click *Next*.

12. In the *Confirm Installation* window, click *Next*.

13. At the Installation Complete window, click *Close*.

4.2 Using the Utility

Double-click the desktop icon to open the Powerline Configuration Utility application.

Privacy Tab
Change the Network Name/Security Key

Local Device
The closest powerline adapter(s) that connects your computer to the electrical system.

Remote Devices
Powerline adapters that are connected to the selected Local Device across the electrical system.

Rename the selected Remote Device

Enter the Device Password (DPW) for the selected Remote Device

Add a Remote Device that was not detected

Scans for Remote Devices that were not detected

Closes the utility application.

- To apply changes to Remote Devices through the Powerline Configuration Utility, you must enter the Device Password (DPW) for each Remote Device located on the Device Label.

- If you have not already done so, please write down the 16-digit Device Password (DPW) and corresponding MAC Address of each TPL-401E powerline adapter as this will be used to input into the utility. This is located on the Device Label, please refer to Section 1.4.

Enter the 16-digit Device Password (DPW) for each Remote Device in the utility

1. Click one of the Remote Devices in the list.
2. Click *Enter Password*.
3. Type in the Device Password according to the corresponding MAC address. Then click *OK*.

4. If successful, the Remote Device will have the Device Password listed next to the device under Password.
   Note: If the incorrect Device Password is entered, you will receive an error message. Click *Enter Password* and try entering the password again.
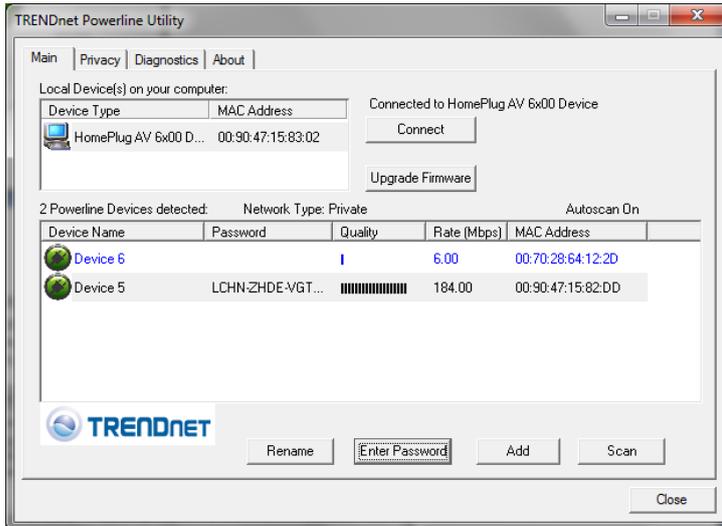
5. Repeat steps 1-4 for any remaining Remote Devices.
6. Once all of the Device Passwords (DPW) are entered into the utility, changes can be applied to the Remote Devices using the utility.

Change the Network Name/Security Key for multiple adapters using the utility

1. Click the *Privacy* tab.
2. Under *Private Network Name*, enter the desired network name/security key and click *Set All Devices.*
3. At the Network Name Setting prompt window, click *OK.*

The current network name/security key assignment of the powerline adapter(s).

Note: If you had previously used the Sync button procedure in generating a random network name/security key. This will display "Unknown Networkname"
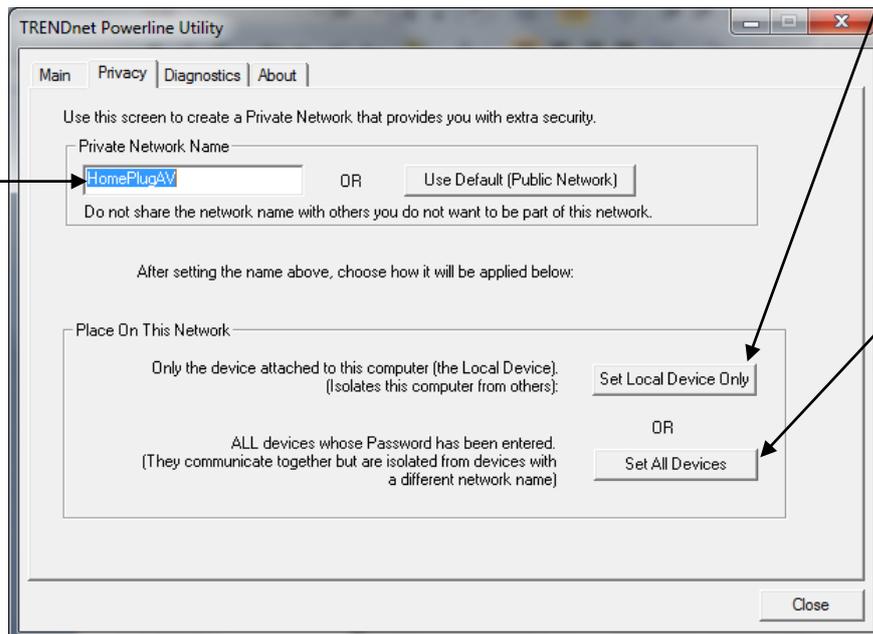
Applies changes to Local Device only.

Note: If you choose this option, you will disconnect the Local Device from the Remote Devices.

Applies changes to Local Device and Remote devices.

Note: If you have not entered the DPW for all remote devices, you will receive an error and the changes will not be applied to remote devices without a DPW.

Chapter 5: Troubleshooting

Please reference the items below if you continue to experience difficulty with installing and using your TPL-401E 500Mbps Powerline AV Adapter.

- Try power cycling the unit by unplugging it from the wall power outlet for 15 seconds and plugging it back in.

- If the PL LED is red indicating good quality only, try plugging the TPL-401E into another available wall power outlet to check if you can obtain better connection quality.

- Use a pin or paperclip and push and hold the Reset button for 1 second on each TPL-401E powerline adapter. All LEDs will turn off and turn back on. This will reset the TPL-401E powerline adapters to the default settings, network name/security key assignment "HomePlugAV".

- The TPL-401E can provide better connectivity and performance when plugged directly into the wall power outlet instead of a power strip or surge protector.

- Connecting the TPL-401E to a power strip or surge protector may degrade network performance or completely stop network signals.

- The TPL-401E should not be used on GFI protected outlets as some outlets will filter out powerline signals.

- The TPL-401E should not be used in areas with excessive heat.

- Certain florescent or incandescent lights are noise sources on the electrical and can degrade powerline performance.

- If your building has more than one circuit breaker box, the TPL-401E may not be able to establish connectivity between different circuit breaker boxes. In this case, connect a TPL-401E powerline adapter to a power outlet located on each of the circuit breaker boxes, and then connect an Ethernet cable between the TPL-401E powerline adapters to bridge the two circuits together. This will allow the TPL-401E powerline adapters from different circuit breaker boxes connect to each other.

Power Saving: The device will automatically reduce power usage when the connected devices via Ethernet are powered off, unplugged or inactive for more than 3 minutes.

Erp (EuP) Operation: Standby Mode

- Disconnect the Ethernet cables from the device Ethernet ports, and after 3 minutes, the device will enter standby mode. The Power (PWR) LED will flash every 15 seconds to indicate that the device is currently in standby mode.

- To return to active mode, reconnect the Ethernet cables to the device Ethernet ports, and the device will re-enter active mode.

Chapter 6: Specifications

Hardware	
Standards	IEEE 1901, HomePlug® AV, IEEE 802.3, IEEE 802.3x, IEEE 802.3u, IEEE 802.3ab
Interface	1 x 10/100/1000Mbps Auto-MDIX RJ-45 Port, Power Prong
Frequency Band	2 ~ 50 MHz
Modulation	OFDM Symbol Modulation on link synchronization, 1024/256/64/8 - QAM, QPSK, BPSK, ROBO Carrier
Protocols	TDMA and CSMA/CA
Speed	Powerline: up to 500Mbps** Ethernet: up to 2 Gbps with Full Duplex mode
Utility OS Compatibility	Windows 7 (32/64-bit), Vista (32/64-bit), XP(32/64-bit)
Nodes	Up to 64 (max.) Recommended: Up to 16* per powerline network
Overlapping Powerline Networks	Up to 4 (per electrical system)
Coverage	Up to 300m (984ft.)
Security	128-Bit AES (Advanced Encryption Standard)
LED	Power (PWR), Ethernet Link/Act (ETH) Powerline (PL) with Connection Quality Indication - Best (Green) - Better (Amber) - Good (Red)
Buttons	Sync, Reset
Dimension (L x W X H)	A: 98 x 72 x 55 mm (3.9 x 2.8 x 2.2 in.) per unit EU: 98 x 72 x 70 mm (3.9 x 2.8 x 2.8 in.) per unit
Weight	A: Total Weight: 300 g (10.6 oz) / Per Unit Weight: 150 g (5.3 oz) EU: Total Weight: 310 g (11 oz) / Per Unit Weight: 155 g (5.5 oz)
Power Source	A: 100~230V AC, 50~60Hz EU: 220~240V/ 5A AC, 50Hz
Consumption	Active mode: 4.69 Watts (max. per unit) Standby mode: 0.85 Watts (max. per unit)
Temperature	Operating: 0° ~ 40°C (32° ~ 104°F) Storage: -20° ~ 70°C (-4° ~ 158°F)
Humidity	Max. 90% (non-condensing)
Certifications	CE, FCC

* Maximum of 16 adapters (nodes) recommended for streaming video across your network. Additional adapters may decrease performance.

** 500Mbps is the maximum theoretical Powerline data rate. Actual throughput will vary depending on environment.

*** Networked Powerline devices need to be plugged into power outlets that are on the same electrical system.

Limited Warranty

TRENDnet warrants its products against defects in material and workmanship, under normal use and service, for the following lengths of time from the date of purchase.

TPL-401E / TPL-401E2K – 3 Years Warranty

AC/DC Power Adapter, Cooling Fan, and Power Supply carry 1 year warranty.

If a product does not operate as warranted during the applicable warranty period, TRENDnet shall reserve the right, at its expense, to repair or replace the defective product or part and deliver an equivalent product or part to the customer. The repair/replacement unit's warranty continues from the original date of purchase. All products that are replaced become the property of TRENDnet. Replacement products may be new or reconditioned. TRENDnet does not issue refunds or credit. Please contact the point-of-purchase for their return policies.

TRENDnet shall not be responsible for any software, firmware, information, or memory data of customer contained in, stored on, or integrated with any products returned to TRENDnet pursuant to any warranty.

There are no user serviceable parts inside the product. Do not remove or attempt to service the product by any unauthorized service center. This warranty is voided if (i) the product has been modified or repaired by any unauthorized service center, (ii) the product was subject to accident, abuse, or improper use (iii) the product was subject to conditions more severe than those specified in the manual.

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