

# AirTies Software Platform Technical Overview

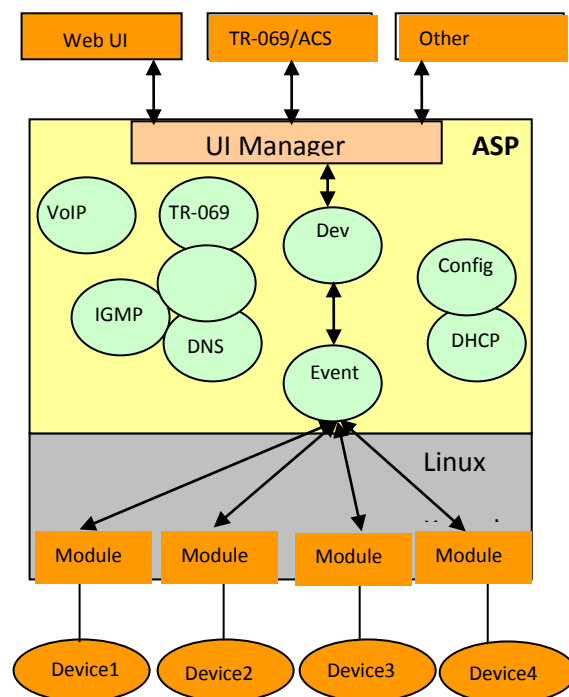
## Introduction

AirTies Software Platform is a propriety software platform developed and maintained by AirTies Wireless Networks. It has full support for router / modem / Wi-Fi /STB devices plus many additional features aimed at solving common problems that home users and Internet Service Providers experience.

The first version of AirTies Software Platform was released in 2007 and has since been deployed in over 4 million devices.

### AirTies Software Platform (ASP)

AirTies Software Platform (ASP) has been developed by the AirTies R&D team to enable chip set independent development of AirTies products and technologies. A common, extendible software platform, ASP makes it possible to create modular, portable, scalable software for all AirTies products.



The benefits of ASP include:

- ***Higher performance, lower cost, advanced features***

ASP makes it easy to rapidly introduce the latest and best chipsets into our products which results in higher product performance and lower cost. Latest technologies offered by new chipsets lead to more advanced product features.

- ***Easy and rapid addition of new features***

A common code base allows us to rapidly add new features to the entire product portfolio. Similarly, an existing feature on one product can readily be used on other products. This also makes it possible to customize our products to the needs of each service provider very quickly.

- ***Products that speak your language***

With ASP, it is easy to incorporate new languages into the product. All ASP-based AirTies products are multi-language.

- ***Ability to apply bug fixes across the entire product range***

Usually a bug fixed for one product means it is also fixed for all products through the common code base.

- ***Fast time to market with new technologies***

We have a close relationship with chip vendors and standards bodies. We follow the latest technology trends and standards and, thanks to ASP, we can develop new products that use these new technologies rapidly and bring them to the market in a very short time.

- ***Flexibility in manufacturing***

ASP provides the flexibility to manufacture a product with the same features in different locations, or switch chip vendors quickly. This flexibility helps lower cost, increase production capacity, and minimize procurement problems.

AirTies devices run on a hardware-independent operating environment built on Linux 2.6 kernel. The kernel modules required are loaded dynamically based on a configuration XML file generated by the build system and is part of the



firmware image. This system resolves kernel module dependencies automatically. There is also a series of applications to handle device configuration, VoIP, TR-069, etc. The end result is low memory footprint and high performance.

## Features

### Chipset portability

Quick release cycles and fast moving chipset developments means that in order to deliver best of breed products to customers, AirTies must have the ability to quickly and effectively change chipset models and vendors. AirTies Software Platform has been specifically designed to be fully portable between different chipsets from different vendor, allowing for features to be fully operational and interoperable between different chipsets and for the development cycle time to be measured in days instead of months.

AirTies Software Platform has been ported to the following chipset vendors –

Atheros

Broadcom

Lantiq (Infineon)

Quantenna



### Mesh

The AirTies gateways and Access Points can be used to create a wireless mesh network inside the buildings where signal absorption, due to concrete and steel structures, are an issue. In forming a mesh network, the AirTies router can be associated with other AirTies Software Platform Access Points to extend the reach and performance of the



network. Mesh Technology allows all video broadcast and IPTV to be distributed wirelessly within consumer homes regardless of the building structure or layout.

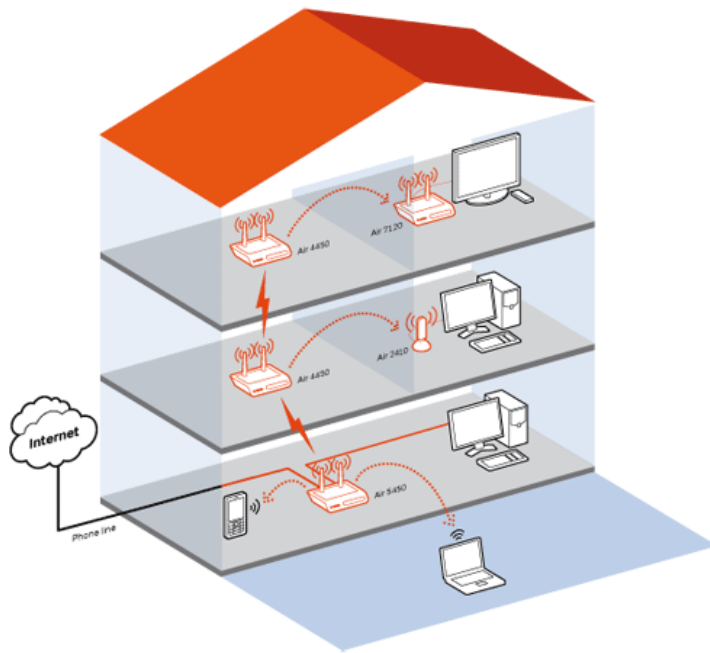
In addition AirTies Mesh provides the following:

- Solves wireless range issues and provides widest wireless coverage in concrete buildings

- Self healing network - Devices automatically pick the optimal path

- Single touch configuration using AirTouch

- Supports multiple SSID's, security schemes and VLANs



## AirTouch

For many users who are not experts, configuring wireless security and AirTies Mesh is difficult. AirTouch is an extension of WPS protocol (WiFi Protected Setup) and makes it possible for anyone to configure these complex settings automatically at the touch of a button. Pushing the “AirTouch” button on the AirTies Access Point is an indication that you can physically reach the device and also that you are a trusted user. When the button is pressed, the AirTouch connection begins, and the security settings between AirTies devices are automatically configured.

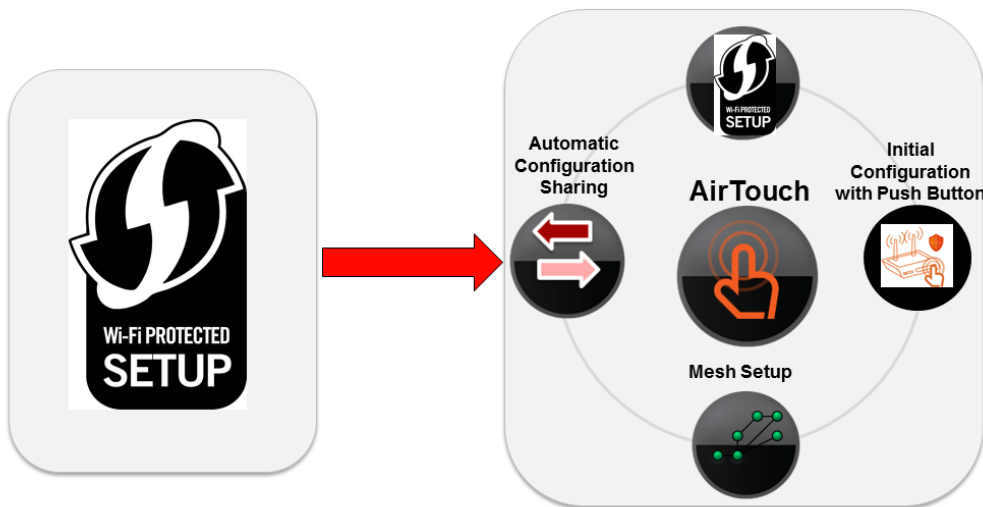


### *What are the differences between WPS and AirTouch?*

AirTouch complies with WPS protocol. So AirTouch supports all clients such as laptops, smart phones, tablets that support WPS. WPS protocol is defined for communication between an Access Point and a client. AirTouch uses WPS protocol as a language for communication between all home networking devices (including Access Point to Access Point communication which is not defined in WPS protocol).



## WPS vs AirTouch



AirTouch has two major benefits in addition to features defined in WPS protocol:

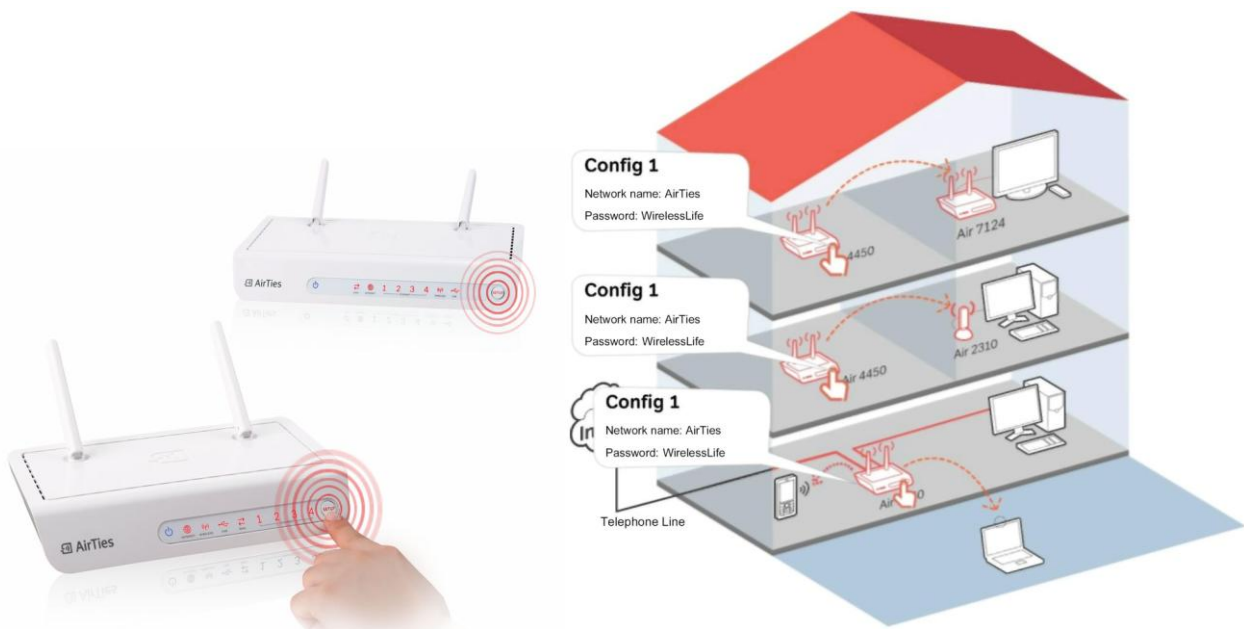
### 1. Extending Wireless Coverage at the Touch of a Button

With AirTouch technology, it is now very simple to setup an AirTies Mesh Network and extend the wireless coverage area.

Signal range can be an issue in multi-story, concrete buildings, or if you want your wireless network to span very large areas. AirTies Mesh Technology provides a solution for extending wireless coverage area through the use of AirTies Access Points that form a Mesh Network and act as repeaters. Setting up a Mesh Network has been a tedious process for some with individual configuration needed on every node. AirTouch technology has simplified this process to push button operations as well. Whether the user is establishing a Mesh Network for the first time or merely adding another node to the Mesh Network, pushing the “AirTouch” button on the APs automatically configures them.

Adding a Mesh node to an AirTies Mesh Network is similar to setting up a wireless client. A previously configured Access Points passes its configuration to the new mesh node when the new node’s “AirTouch” button is pressed within two minutes of pressing the button on the already configured Access Point.





## 2. Automatic Configuration Sharing

AirTouch technology allows Automatic Configuration Sharing where any changes to the wireless configuration of a node are automatically sent out to all nodes in the network. For example, if the wireless network password on a Mesh network consisting of three wireless Access Points and Set Top Boxes needs to be changed, you no longer need to set the password on each Access Point and Set Top Boxes. Any change to one of the Access Points gets propagated to the others automatically synchronising the settings of all wireless nodes in the network.

The configuration update is triggered when a node discovers there is a configuration update on another node. No user intervention is necessary and configuration can be updated any any node first.

AirTouch provides -

- Complete network set up and configuration at a touch of a button
- More secure setup (Propagation of security and network settings)
- Automatic configuration of Automesh ID's, VLAN and QoS settings

This is patented technology only offered by AirTies products.



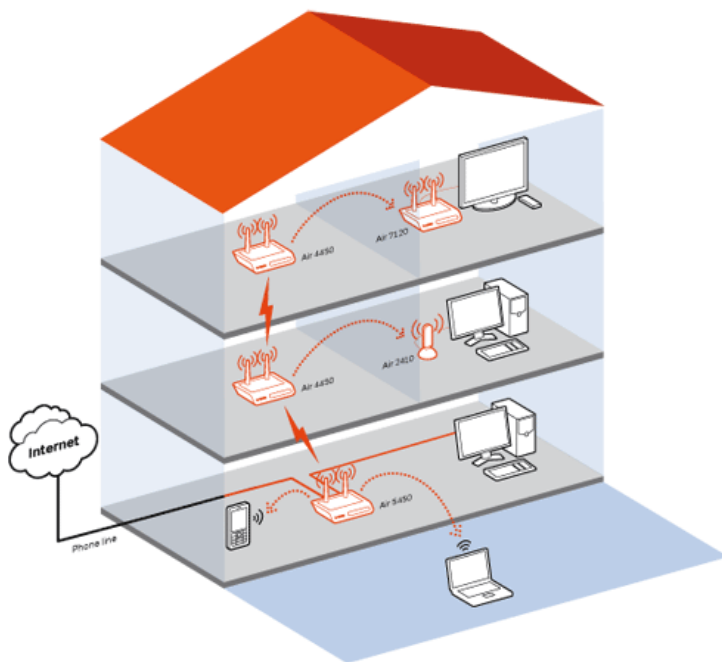
## Universal Repeater

Universal Repeater allows for AirTies Access Points to repeat the signal of any Wi-Fi compliant device. Weak signals and dead spot problems on a wireless Access Point can be solved by adding AirTies Universal Repeater between the existing gateway and the areas suffering from weak coverage.

Universal Repeater is implemented by the Access Point device operating as both a client connecting to the existing Access Point and an Access Point.

Setup is implemented with AirTouch (as long as the existing gateway supports WPS).

In addition to repeating the signal the device also works as a bridge for Ethernet enabled devices. If you need to connect devices with an Ethernet port, such as Set Top Boxes, to an existing gateway then the universal repeater feature makes this possible.



## Wireless Video Distribution

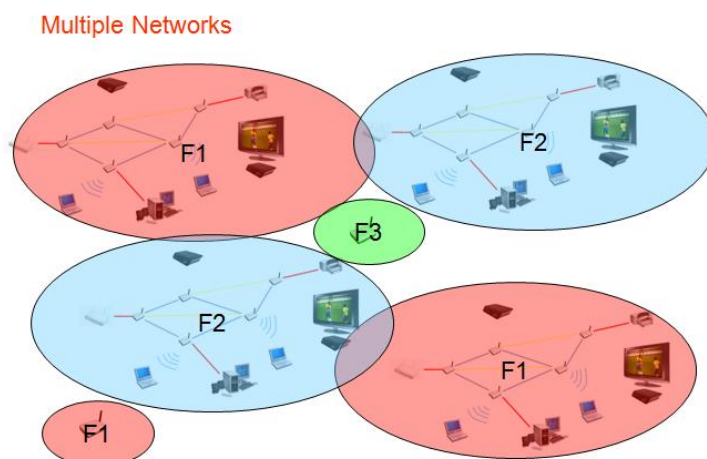
In environments where concrete walls are in the way or where the frequencies in which wireless transmission takes place are full, AirTies Wireless Video provides uninterrupted communications at 5GHz to transfer video/IPTV packets.

Physical layer improvements have been implemented. Most competing technical solutions rely on improving the delivered speed between the transmitter and the receiver. The simplistic theory being if you have a fast enough pipe then issues like priority, latency and jitter go away. We agree this is the case, however we believe the cost of implementation will be significant for the next 3 to 5 years. Therefore we have developed a number of algorithms to optimize the performance of mainstream 2X2 11n to reliably deliver video packets on time instead of optimizing for pure speed.

MAC layer optimizations have been made: The drivers and MAC layer software that controls the way wireless network operates from the chip vendors are optimized for data throughput and winning file transfer benchmarks and regularly loose or drop packets. We have rewritten the majority of this critical software to focus on the elimination of dropping packets. We are inspecting every packet header and automatically prioritizing video packets and setting Quality of Service settings. IGMP snooping directs video packets only to the specific logical port, and multicast streams are converted to unicast. We also manage standard chip peculiarities such as shutting down the wireless channel for 200mS every two minutes to do a calibration.

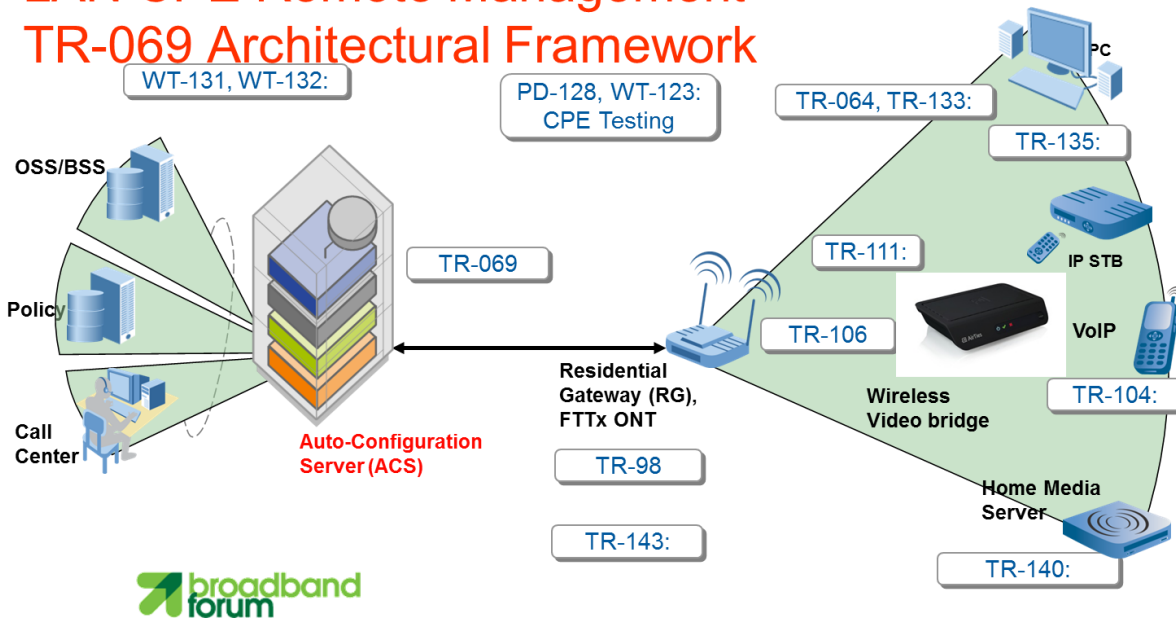
Smart queuing and jitter avoidance are implemented: Video buffers at both the transmitter (AP) and receiver (STB) manage which packets have been actually received and retransmit lost ones while maintaining packet ordering critical to video. Jitter avoidance technology time stamps each packet and ensures video arrives at a competitors STB as if it was a wired Ethernet connection with a small delay.

Interference avoidance At 5GH has been developed: There are 22 channels of 20MHz spectrum per channel. These are unlicensed and prone to interference. Interference can come from many devices operating in the spectrum including new Wi-Fi devices or a neighbor using wireless video in an apartment. In an AirTies network all devices including mesh nodes regularly scan all available channels for noise, interference and traffic. This data is collected from all locations of the network. All of this information is collected and analyzed at the root AP and if necessary a decision to change the wireless channel is made. The exact timing of when the channel change will occur is communicated to all AirTies devices and they change channels at the same time. This can occur every few seconds and occurs without dropping a single packet.



## Remote Management TR support

### LAN CPE Remote Management TR-069 Architectural Framework



- Certified by major ACS vendors (Alcatel-Motive, supportsoft). 4 million products being managed by ACS
- All AirTies Products support auto firmware upgrade
- AirTies products support both dual image and recovery image to avoid failures during firmware upgrade
- Auto Firmware Upgrade through:
  - TR-069 ACS
  - AirTies Network Assitant
  - HTTP based firmware upgrade
  - Multicast Firmware upgrade (The Multicast upgrade method will work only in a managed network environment due to the use of multicast protocol)



## DLNA / UPnP AV Digital Media Server

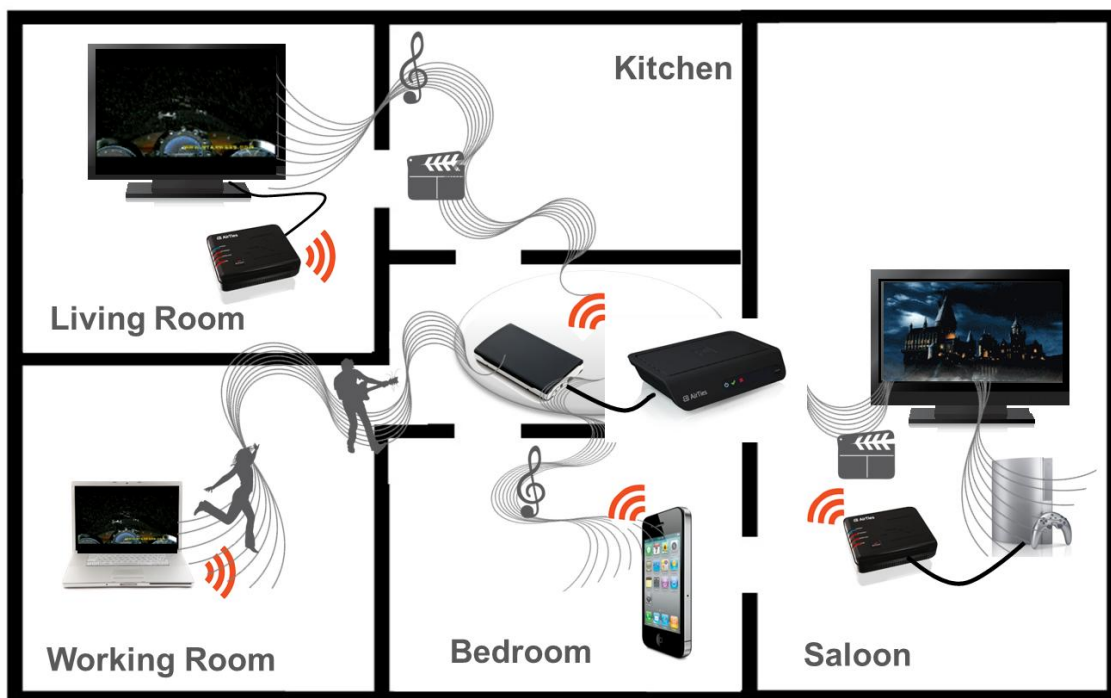
A Media Server is a program that shares media stored on a storage device to a compatible Media Player. AirTies Software Platform includes a Media Server that runs on Access Point and Gateway devices, allowing a user to connect a USB drive to the device and create a Media Server.

The contents of an attached USB disc are scanned and the media is indexed to allow for quick access and searching from Media Players. The Media Server is advertised on the network so that any Media Players can find the device. Filters for media are applied on the Media Server, allowing media to be viewed by filters such as artist, album name.

Parental controls on the Media Server allow for users to prevent certain media from playing on certain devices. This allows users to control what content can be played on what device within their home.

The Digital Living Network Alliance (DLNA) is an organisation that maintains a standard to allow devices to share media with each other. Products that are DLNA certified can share media over a network. AirTies Media Server is DLNA compatible and will work with DLNA certified devices.

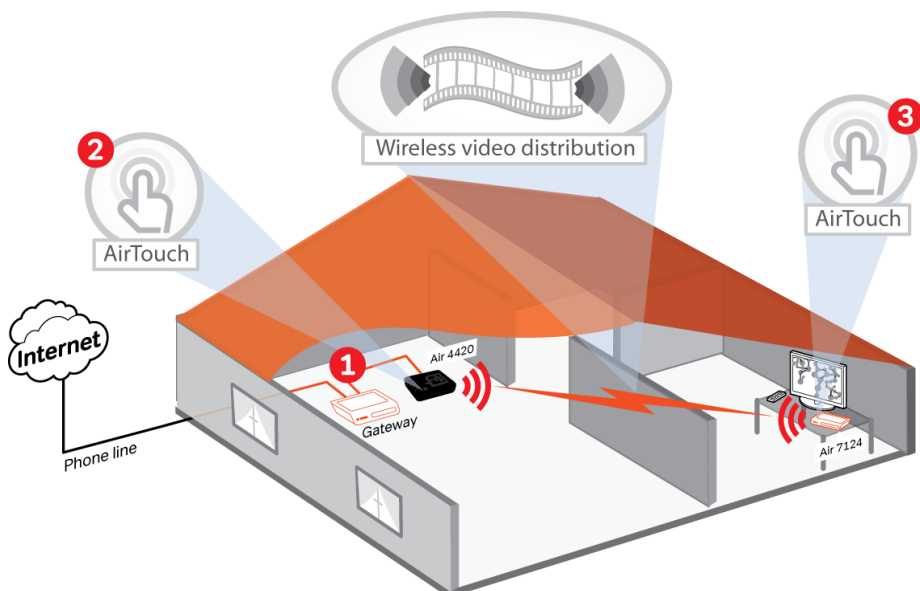
Universal Plug and Play Audio Video is a standard to allow music, video and photos to be streamed from an UPnP AV Media Server to an UPnP AV Media Player. AirTies Media Server is UPnP AV compatible and will work with UPnP AV compatible devices.



## Full IPTV Support

AirTies Software Platform contains all the features needed for an IPTV application. It supports VLANs to be able to separate IPTV and data traffic. For cases where a single VLAN is used for more than one type of service, the IP Quality of Service feature can be used to prioritize packets and reserve bandwidth based on traffic type.

The Any Port Any Service feature allows the device recognize the IPTV devices connected to it no matter which Ethernet port they use and automatically forward that port to the VLAN reserved for IPTV traffic. Thus, service is uninterrupted even if the user changes the port the IPTV device is attached to. AirTies Software Platform can support IPTV service in both router and bridge modes. It can transfer various DHCP options (option 60, 121 etc.) necessary for the initial configuration of IPTV devices from the provider network's DHCP to the IPTV device.



## High Performance 4x4 WLAN Support

AirTies Software Platform supports 802.11n 4x4. In environments where concrete walls are in the way and where the frequencies in which wireless transmission takes place are full, AirTies Software Platform provides uninterrupted communications at 5GHz to transfer video/IPTV packets. With the smart frequency selection feature the device selects the most suitable frequency for itself, and with the Quality of Service feature that gives high priority to video packets.

A high speed Wireless Bridge can be created to enable connect devices in the home that have only an Ethernet port, such as Internet TVs, Set Top Boxes and Game Consoles.



## USB Host Services

Many small business and home users would like to share a printer or store personal content on a shared disk. USB Host enabled products allow sharing of printers and disk drives

Printer or disk drive is always on and available

Support for 3G dongles to provide backup Internet

