

# WaveCAST™ Network Guide

FOR CONSULTANTS AND IT PROFESSIONALS



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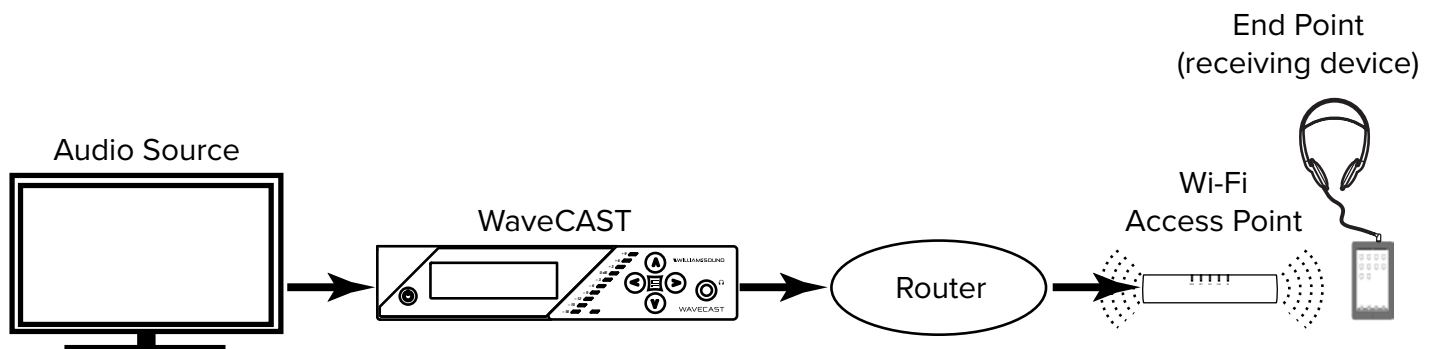
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## Description

A typical WaveCAST system consists of the following segments: Audio Source, WaveCAST Server, Router/DHCP Server, IP Network (including Wi-Fi), and receiving device (end point).

WaveCAST receives live audio from sources such as TVs, cable receivers, satellite receivers, microphones, sound systems, etc. WaveCAST then encodes the audio onto an IP Network so the encoded audio can be sent through the Wi-Fi network to smartphones or tablets, as well as the WaveCAST Receiver.

## How it Works



Audio is taken from the source (TV's, cable, satellite, live sound systems, etc.) and brought into the WaveCAST Server via analog or Dante connections. The WaveCAST encodes and broadcasts the audio over the IP network.

The Wi-Fi Network may consist of Wireless Local Area Network (LAN) Controllers, Router/DHCP Server, and/or Wi-Fi Access Points (APs). Enterprise level Wi-Fi APs are sometimes controlled by WLAN controllers. Ruckus Wireless Networks are preferred based on proven performance but other enterprise level Wi-Fi equipment may also work if properly configured for use with WaveCAST. The Wi-Fi network also includes the end point devices, smartphones and tablets with the WaveCAST App installed or the WaveCAST Receiver.

## Audio Requirements

All models of the WaveCAST accept balanced or unbalanced audio via a XLR/ (1/4)" plug combination jack and is optionally either stereo or monaural.

There is also a Dante version of the WaveCAST Server with a dedicated RJ-45 port on the rear panel.

## Standard WaveCAST System Network Requirements

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The WaveCAST should be purchased with the expectation of connecting to an existing network. The WaveCAST is configured to receive a DHCP address from a DHCP server on the existing network, but can be configured to use a static IP address in the WaveCAST settings (see full user manual for details).

Both unicast and multicast modes are available. The mode must be selected by the user in the WaveCAST settings (see full user manual for details).

Unicast mode made for 45 users or less.

For multicast mode, the network must pass more than 45 users from the WaveCAST to the access points (APs). The APs must be able to deliver multicast to multiple end points simultaneously.

End points must be able to communicate with the WaveCAST. It is required that the WaveCAST and the end points are on the same subnet. The TTL is selectable in the WaveCAST settings (see the full user manual for details).

Likewise, the end points must not be isolated from the WaveCAST. In a guest Wi-Fi environment, it is usual to have the SSID connections “isolated” from the LAN. The Wi-Fi connections will need to have access to the WaveCAST and vice versa. This can be accomplished either by creating acceptable routes from the Wi-Fi to the WaveCAST, or by making the SSID non isolated from the LAN that the WaveCAST is located on.

***It is strongly recommended to have the site evaluation and wi-fi equipment configuration developed and implemented by a professional wi-fi implementation company.***

### **Port Information**

The server transmits audio from UDP port 3302 to UDP port 3303 in both Unicast and Multicast mode.

The server control commands on the mobile app are received by the WaveCAST on UDP port 3300 and replies are sent back to UDP port 3301.

## Considerations for an Interference-Free Network

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Since the WaveCAST system uses Wi-Fi as its medium for transmission, care should be taken to minimize obstructions between the access point and user devices. The more numerous or significant the obstructions, the less consistent the performance will be.

Access points are critical to optimal performance of the WaveCAST user experience. There must be adequate Wi-Fi coverage to accommodate the space where users are expected to be utilizing the WaveCAST App.

User density must also be considered as different access points will allow different amounts of maximum client connections. The Wi-Fi network must be able to accommodate all users within the space with adequate bandwidth.

Signal strength should be kept strong in all areas required, no less than -60 dBm. Signal strength is also impacted a great deal by frequency and co-channel interference. Interference mitigation is critical.

Channel hopping by the access points can cause quick audio interruptions. It is advisable to use manually configured and stationary channels within the Wi-Fi network. It is also recommended to increase the minimum allowed connection rate. Using the 5 GHz band only may improve performance due to less network interference but this will also eliminate devices that are only capable of utilizing the 2.4 GHz band or devices unable to recognize the higher channel frequencies within the 5 GHz band.

Keep in mind, encryption uses bandwidth and reduces the number of successful connections substantially in a Wi-Fi environment and must be taken into account.

## Multicast Details

The WaveCAST App (the end point) discovers if there is a WaveCAST on the network by sending a broadcast packet and listening for response on multicast address. The multicast group range must be kept available and allowed on the network.

When the WaveCAST App selects a channel, the server begins to stream the audio on that channel to the device (if not already doing so). The access point should be configured to support multicast. Refer to the AP/Wi-Fi manufacturer's documentation.

The network should support: IGMP, IGMP Snooping, and Multicast.

The network and SSID should also be configured for Voice or Premium QoS, (or other priority QoS depending on Manufacturer). The WaveCAST uses similar settings as most VOIP configurations, and DSCP .46 or EF for QoS classification.

## Specifications

Router	Ports	Information
Operating System	End Point (receiving device)	Apple iOS 9.1 or newer Android 6.0 or newer Blackberry/Windows currently not supported
Bandwidth	Initial App Connect(i)	Background = 128 Kb per device
	Audio	Wired Bandwidth = 30 Kbs/S per configured channel Wi-Fi Bandwidth = 30 Kbs/S per connected channel (ii)

<sup>i</sup> After connecting to the WaveCAST, when the WaveCAST App is launched there is an initial connection that will download background content to the device. This initial connection happens once per device per session.

<sup>ii</sup> Connected channels are any channel that has at least one device actively playing the channel, (joined to the Multicast Group). It does not matter how many devices are joined to a particular channel, it is connected if one or many devices are joined.

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