

# VR Room-Scale Setup – HTC Vive



## Setting up a physical space for using the HTC Vive

Virtual reality offers an immersive, personal experience with virtual content. A feeling of presence can be maintained while moving through a physical area when using certain VR technologies; this paper focuses on the particulars of the room-scale HTC Vive setup.

### Chaperone Area

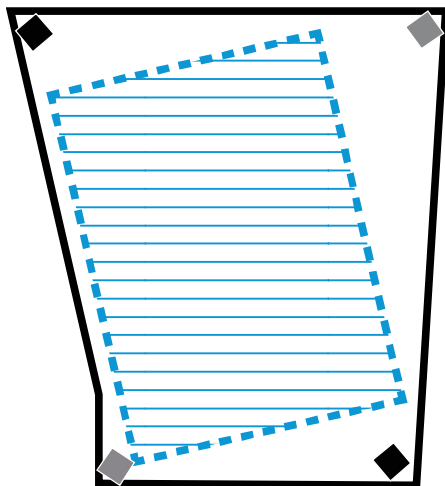


Fig. 1 – Example of a rotated Chaperone boundary inside an irregular space.

The two black boxes represent ideal placement for lighthouses, the gray boxes represent poor placement.

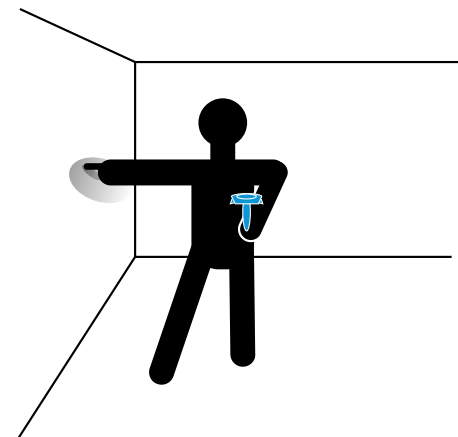




Fig. 2 – Example of using an outstretched arm to place the Chaperone boundary safely away from the wall.

Note that the controller is in the hand away from the boundary.

Steam®VR provides the software and other technology foundations for the Vive's head-mounted display (HMD) tracking. Steam®VR requires you to define a safe area for movement and activity in your room. The perimeter of this area is marked in VR by 'the Chaperone' boundary, which looks like a colored grid and floor outline. By default, the grid and floor outline are only visible when the user is near the boundary. However, the floor outline, or the floor outline and the grid, can be made visible all the time, or never, through the Steam®VR settings. To change the Chaperone settings while wearing the HMD:

1. Open the System Dashboard by clicking the system button  on a controller.
2. Click on the settings icon  in the bottom right corner.
3. Select Chaperone under the Steam®VR Settings menu.
4. Configure the Chaperone bounds to the desired visibility.

To create the Chaperone boundary, Steam®VR will walk you through the process of marking the perimeter of the useable area. The Chaperone area will then be calculated by finding the largest available rectangular area. The final rectangle must be a minimum of 2 x 1.5 meters (6.5 x 5 feet). Depending on the shape of the area you mark out, the inner rectangle may be rotated unexpectedly. You have the opportunity to manually adjust the chaperone area during the setup process as well.


Keep in mind that a person in VR is blind and often deaf to the outside world. Take into consideration the placement of doors, fragile objects like windows, computer monitors, other equipment, and the lighthouses or their stands. Most VR users end up hitting a wall with the controller or walking into a desk

given enough time in VR. When setting up the Chaperone boundary, it can be helpful to hold the controller at your shoulder while extending your empty hand outwards, and touching the empty hand to the wall as you walk around. This creates a full arm's-length of free space to protect your walls (and your hands) during VR experiences. If you expect to give demonstrations or to have spectators, you will also want to leave extra space in the room.

### Lighthouses (Base Stations)

The Vive comes with two lighthouses or "base stations." These look like cubes with a glossy plastic front and hardware on the back. The lighthouses are used to track the position of the Vive headset and controllers inside the Chaperone area.

Moving the lighthouses will force you to re-calibrate the Chaperone boundary, so you should take the time to consider the optimal lighthouse placement beforehand. It is necessary to maintain a consistent line-of-sight between the lighthouses, and also between at least one lighthouse and the Vive headset and controllers, so you should mount the lighthouse above head-level. The lighthouses illuminate a 120° frustum, so place your lighthouses such that they will illuminate the entire Chaperone area, including under the lighthouse if necessary. You will have to pitch the lighthouse downwards a minimum of 30° in order to illuminate the floor under the lighthouse. As a final consideration, the lighthouses should not be placed more than 5 meters (16 feet) apart.

The lighthouses should not be positioned with any roll left-to-right, but as described above, they may pitch downward. The lighthouses should be set to channel "b" and "c", unless using the sync cable as described below. The channel can be set by pressing the channel button  on the rear of the lighthouse.



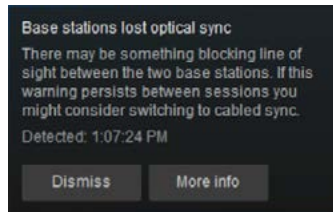
**Fig. 3** – Lighthouse from the front. Note the channel indicator in the lower left corner.



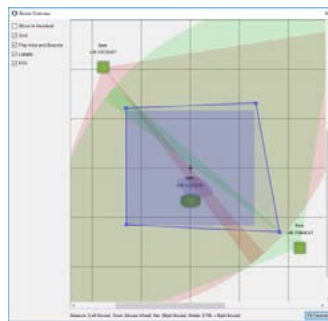
**Fig. 4** – Lighthouse from the rear. The centered silver item is threaded receiver for mounting hardware. From left-to-right, the bottom items are: power in, channel button, optical sync cable, and USB port. (for firmware updates).



**Fig. 5** – Lighthouse from the right. This lighthouse is mounted to a tripod and connected to power.



**Fig. 6** – Error dialog indicating that a sync cable is necessary.



**Fig. 7** – Screen capture of the Room Overview window.

The lighthouses come with a sync cable terminating in 3.5 mm jacks. This cable helps the lighthouses coordinate, and is necessary if they do not have a good line-of-sight to each other. When using the sync cable, one lighthouse must be set to “A” and the other set to “B”. A warning message is displayed on the desktop if optical sync is lost.

Advanced users can see the view frustums of the lighthouses and a live update of the tracking information for the headset. This can help you to understand the lighthouse’s tracking area and find blindspots in a room. To view the tracking information:

1. Right-click on the Steam®VR icon in the system tray.
2. Click Settings.
3. Find the Room and Tracking section.
4. Click the Room Overview button.

## Other Considerations

At a minimum, a standard setup will require wall power for 2 lighthouses, a headset, a computer, and a monitor. For convenience, you will also want one available power outlet for charging each of the 2 controllers.

Reflective surfaces, such as polished metal, mirrors, and even window glass can cause problems with the Vive’s tracking system. This is because the system relies on infra-red lasers, and reflective surfaces may cause the lasers to bounce unexpectedly. If you discover that VR tracking is not working well, try covering reflective surfaces and re-testing.

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