Deployment of Multiple LAN Switches within a System

User Guide

Introduction

When a multiple switch deployment is required for geographically large VIP-UHD systems, where perhaps buildings are connected via fiber links, or systems with a large number of RTI VIP-UHD devices (usually over 51); there are considerations to be made when it comes to system design.

Single Switch System Architecture

When using RTI VIP-UHD devices, best practice is to keep them to a dedicated network switch (or switches). This keeps the HDMI over IP network traffic from slowing down other devices, where they to all be used on a single switch architecture. This way, performance is maintained for both the RTI VIP-UHD system and the main network devices (3rd party integration, WiFi etc).

When all that is required for the VIP-UHD system is a single switch (as per diagram below), deployment is very straightforward. All of the VIP-UHD devices are connected to the dedicated single switch and a single connection made from this switch, to the control module of choice for the system. The VIP-UHD-CTRL is then seperately connected to the main network.

Within a single switch system architecture, the switch will manage the 'stream' being sent in and out of each switch port. Assuming the choice of switch is capable of routing a maximum of 1Gb in and out of each port, there is no need to consider the aggregation of mulitple streams passing through the switch.

RTI VIP-UHD Network Switch   Customers Business / Home Network Switch

VIP-UHD-CTRL
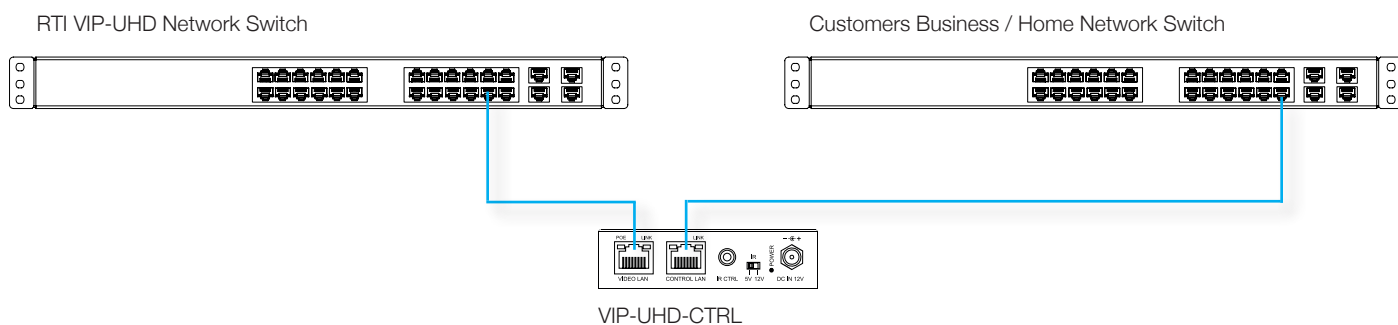
PoE Budget

Be mindful of PoE budget within switches. RTI VIP-UHD devices use between 6W - 9W of power. A switch may not have enough PoE budget (enough power) to allow a VIP-UHD device to be used on every port of the switch.

It is less likely these days with most switches featuring PoE plus as standard, with a bigger amount of power available per port, and therefore larger PoE budgets overall within switches.

Aggregation of Data for Multicast Streams

The first item to consider when designing a multi-switch system will drive the choice of switch model you make for the multi-switch deployment:

1. It is not necessary to use "Stackable" switches with the RTI VIP-UHD system. Layer 3 Managed Network switches are perfectly well specified.

2. Consider the amount of bandwidth available on the switch/es uplink ports. These are the ports that connect one switch to another. Usually they take the form of an "SFP" port where a fiber module can be inserted to carry higher bandwidths than the standard RJ45 ports over greater distances. These ports will usually have 10Gb or 5Gb of bandwidth. We recommend choosing a switch model with a 10Gb bandwidth for the SFP ports and connecting the switches via fiber.

The uplink is the most important part of a multi-switch deployment. The first important point is that 0.9Gb should be used as a maximum figure for each VIP-UHD transmitter in a system. A normal RJ45 copper connection on a switch will likely only have 1Gb of bandwidth and therefore will only carry one VIP-UHD transmitter stream to a single VIP-UHD receiver perfectly.

An important thing to note is that it is not true to say that all of the Transmitters' streams will be sent between all the switches in a multi-switch deployment all of the time.

VIP-UHD Network Switch 1

VIP-UHD Network Switch 2

VIP-UHD Transmitters
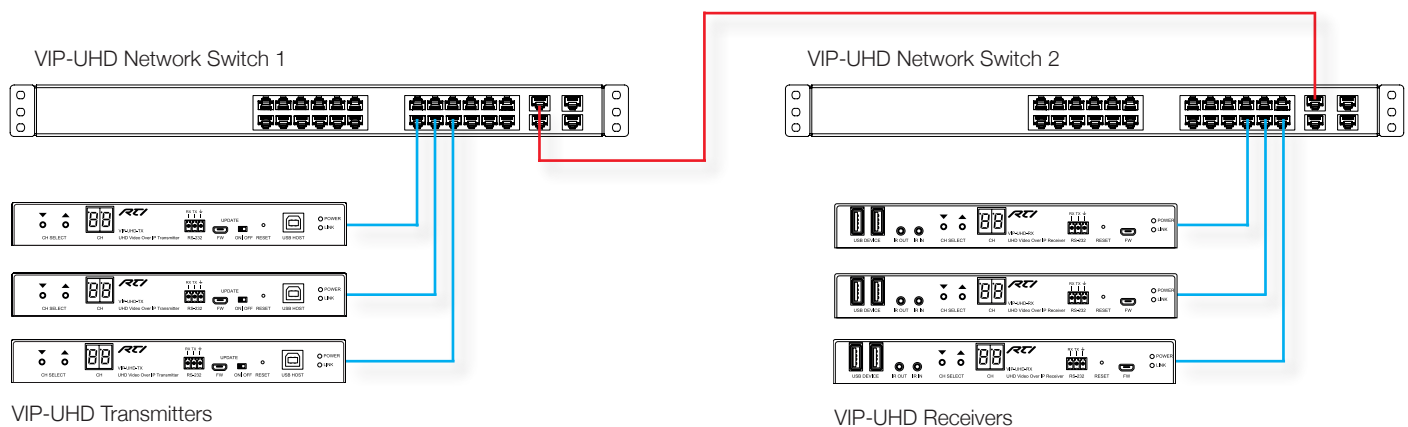
VIP-UHD Receivers

In the above example, if only **ONE** 4K UHD stream is required for all three of the VIP-UHD Receivers, then a total uplink between the two switches of 0.9Gb will be required. As there would be only one stream being transmitted from the Transmitter to all three Receivers. If however the VIP-UHD Receivers are going to work independently (watching different sources) then there will be up to **THREE** streams passing between Switch 1 and Switch 2, so the total aggregation will therefore be 2.7Gb (3x 0.9Gb).

It is possible to reduce the data a VIP-UHD Transmitter streams by lowering the resolution of the HDMI signal the transmitter is sending. 1080p resolutions can typically use a maximum of 0.5Gb and therefore more of these sources will transmit over a 10Gb link than those at 4K resolutions using up to 0.9Gb. There are also options to reduce the bandwidth the transmitters use to fixed levels within the RTI VIP-UHD device web interface. When doing so, image quality may suffer and we recommend this only as a last resort.

With that in mind, it is important to think about the resolution of the source devices you are putting into the VIP-UHD system and how much bandwidth might be required over each switch uplink at any one time. What might be required is an amount of "load balancing", where VIP-UHD transmitters are spread about the switches, to minimise the amount of data that needs to be transferred across the uplinks at any one time. For example, if a satellite receiver is usually watched in only four rooms of the property, make sure that this transmitter is connected to the same switch as the VIP-UHD receivers for use in those rooms. Keeping the data internal to the switch, therefore no uplink data is used.

Stacking Multiple Switches

When stacking switches it is important to understand the settings within the switches themselves in order to install multiple network switches. With most switch manufacturers, only the 'Master' switch will manage the multicast routing, with all other switches being set as 'Slave' units. Please consult your network switch provider to fully understand the configuration required to successfully implement a multi-switch installation.

When stacking more than 2 switches, where only a single (10Gb) uplink is required, the recommended architecture for connections would be as follows:

VIP-UHD Network Switch 1 (Master)

VIP-UHD Network Switch 2 (Slave)

VIP-UHD Network Switch 3 (Slave)
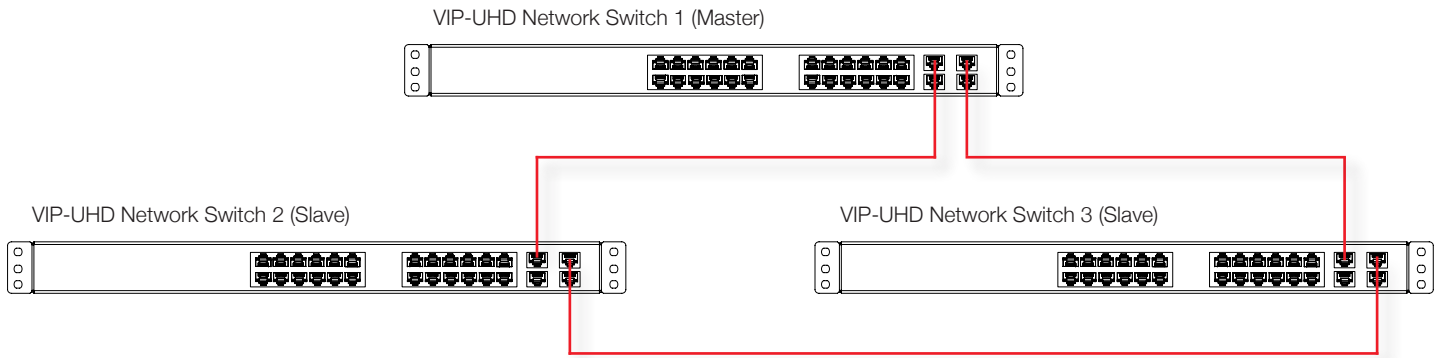
Whilst it is not necessary to have a link between switches 2 and 3 as shown above, this will act as a back-up loop ensuring that should one of the uplinks fail, then the multicast streams can take an alternative route to provide the streams to their intended destination regardless of where the VIP-UHD transmitter and receivers are located.

Should an uplink of more than 10Gb be required, then multiple SFP ports can be linked and run in parallel giving increased data connectivity capabilities. Where required, it may be wise to consider the locations of the RTI VIP-UHD Transmitter units to help spread the load required between switches.

Please note: desinging in a back-up as outlined above would always be recommended, however it is important to consider the signal aggregation required should the back-up be required to ensure a smooth flow of data between all switches based on the port locations of the RTI VIP-UHD Transmitters.

The RTI Technical Support Team is always here to help with switch specification and system layout. Make sure to always speak to your authorised distributor or RTI Technical Support for assistance before deploying a multi-switch system.

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