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1. Introduction

1.1. The Purpose of the Document

The design of a VINX AV network is not limited to the application of only one network switch. When more Layer 2 (L2) switches are installed, the VINX system can be expanded to connect dozens of endpoint devices. This document shows the opportunities of a big VINX system through an example of a realized VINX AV network with seven connected L2 network switches.

This application note is about a test system that has been built in Lightware’s Test Lab demonstrating the following main numbers:

- There are 7 network switches in the system, a core and six connected switches.
- 63 encoder and 56 decoder VINX devices are in the system altogether.

Furthermore, you will find some tips on how to install more VINX devices into this system and/or expand it for even more VINX endpoints.

1.2. VINX Device Concept

The key feature of the VINX series is that the devices can be arranged into an Ethernet-based, distributed virtual matrix. In this network you can achieve point-to-point and point-to-multipoint connections as well. Furthermore, a video wall can be defined with features like scaling or rotating of the image. Besides, further data is handled as different layers like the transmission of RS-232, USB and Infrared signals.

INFO: The USB, Serial, and IR data transmission works independently from the video signal presence.

The working mode between two VINX devices can be Multicast or Unicast. For this kind of installation all VINX devices are used in Multicast mode.

DEFINITION: The Unicast mode is for point-point connection: assign an Encoder and a Decoder directly to each other. The devices can be connected directly or via the L3 switch.

DEFINITION: The Multicast mode is for point-multipoint connection: assign an Encoder and many Decoders to each other (L3 switch is a must in this mode).

Unicast Mode (Point-to-Point Connection)

A Decoder is connected to an Encoder device.

Multicast Mode (Point-to-Multipoint Connection)

Many Decoder devices are connected to the same Encoder via a network switch.
2. Multi-switch VINX System Example

2.1. System Design
2.2. Technical Background

- The central unit is the Netgear M4250-16XF OPT switch with its 10GB-capable Ethernet ports.
- All network switches are connected to the core switch directly.
- PoE and SFP modules are supported only by the VINX-AP series devices.
- There is an OOB (Out Of Band) management port on each switch. These ports are connected to a separate network, which is used for configuring the switches.
- A dedicated PC is connected to the Switch Management Network to arrange the switches and monitor the network traffic.
- There is one or more Ethernet ports on the network switches that are dedicated trunk ports. They do the network traffic to and from the core switch.
- The following parameters have been set in all switches:
  - IP address setting
  - Jumbo frames
  - Switching fabric
  - Throughput
  - Packet buffer
  - IP Multicast routing entries
  - Multicast IGMP group membership

INFO: The network demonstrated here has been built by the available network devices. Some of them can be replaced with smaller devices (e.g. with less Ethernet ports).

2.3. Network Planning, Designing and Scaling

A VINX device needs 1 GB bandwidth – up or download – depending on the endpoint device: encoder or decoder. That is the base for calculating the cabling and the necessary bandwidth:

<table>
<thead>
<tr>
<th>1Gb port</th>
<th>1x10Gb port</th>
<th>2x10Gb ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Encoder + 1 Decoder</td>
<td>10 Encoders + 10 Decoders</td>
<td>20 Encoders + 20 Decoders</td>
</tr>
</tbody>
</table>

In the latter case two 10Gb Ethernet ports (SFP+) are connected between the core switch and the connected switches to have enough bandwidth.

If you take a closer look at the system diagram, you will see that it can be expanded as follows:

- Switch #3 has 9 ports that are not used. A further 9 VINX devices (encoder or decoder) can be connected; the bandwidth is enough.
- Switch #4 has 7 ports that are not used. A further 2 encoders and 5 decoders can be connected.
- Switch #5 has 7 ports that are not used. A further 6 VINX devices can be connected if another connection is established towards the core switch by a trunk port.
- Switch #6 has 15 ports that are not used. A further 15 VINX devices can be connected to the switch.

To sum up: with these possibilities a further 37 VINX devices can be connected to the current system.
2.4. Viewpoints

The following sections contain screenshots about the control software and web pages of the devices installed in the system.

Core Switch

Port Configuration (Fast leave and Querier are enabled)

Deep Technical Settings

The important settings and parameters of the network switches are described in the following Application note:

2. Multi-switch VINX System Example

Multi-switch AV Network for VINX – Application Notes

Lightware Device Controller

Device Discovery Window

Grid View of the Crosspoint