DESIGN GUIDE / KB21010

Video-over-IP network design

Size a video network from the encoder specifications and expected viewing patterns. A device count alone cannot establish uplink capacity or switch compatibility.

Gather the inputs

- Record endpoint and controller model, firmware, codec, resolution, frame rate, worst-case bitrate, transport mode, discovery and clocking. Count switch ports for sources, receivers, control and spares. Verify required link speeds, media and PoE class.
- For every direction on each link, add the distinct multicast groups crossing it and the actual unicast copies, plus audio, management and overhead. Example: twelve distinct streams measured at 700 Mb/s each occupy 8.4 Gb/s before any omitted overhead or other traffic. A 10G link has only 1.6 Gb/s nominal remainder.

Choose the topology

- One switch when port count, reach, PoE, and capacity allow. For two or more switches, assign VLAN trunks and size every interconnect. For many racks, use a planned aggregation or spine design. Virtual stacking only changes management. Physical stacking needs documented hardware and adds its own bandwidth constraints.
- Keep loop protection. If using LACP, verify capacity per member as well as in aggregate. Select supported optics and record loss budget, connectors, reach and any required FEC.
- Budget power per port and in total using endpoint maximums and switch supply/failover behavior. Confirm compatibility with the exact powered device.

Configure and commission

1. Assign media and management networks and verify endpoint discovery. Configure IGMP snooping and one active querier per multicast media VLAN. Use the endpoint-required IGMP version and frame-size policy. Leave Fast Leave disabled on shared links.
2. Use approved firmware and configuration files for the exact hardware revision. Back up before applying any file. Use the companion configuration-upload guide rather than archived serial-prefix or firmware shortcuts.
3. Test peak cross-switch traffic, stream changes, cable and power failures, PoE recovery, and observed queue/port drops. Save the verified state and hand over the port map and failure-test record.

References

Niveo NGSME8H/16/24 managed-switch manual
Niveo NRS managed-switch manual, rev. 3.1
IETF RFC 4541, IGMP and MLD snooping considerations
WyreStorm NetworkHD Technical Reference Guide
SDVoE Alliance

Documentation review. Validate with the exact firmware and endpoints before deployment.