WHITE PAPER / KB202517

Network performance parameters in AV-over-IP

Understand four switch specifications and identify the right counters when a media system drops packets.

Packet buffer and latency

- An egress queue absorbs short bursts when ingress briefly exceeds egress. Repeated or sustained oversubscription eventually causes loss even with a large buffer. A deep queue can add latency before packets drop.
- At 1 Gb/s, 16 MB of decimal buffer takes 128 ms to drain if the entire buffer is available to one queue and no new traffic arrives. At 10 Gb/s it takes 12.8 ms. Total advertised memory is often shared or subject to per-port or per-queue limits.
- Confirm queue discard and congestion counters while switching sources or starting many synchronized streams. A clean average utilization graph can miss microbursts.

Switching capacity and forwarding rate

- Datasheets often count full-duplex switching capacity as twice the sum of port line rates. For 24 x 1G plus 4 x 10G, that convention gives 128 Gb/s. Compare vendors using the same convention. An undersized uplink is distinct from a switching-fabric limit.
- At minimum-size Ethernet frames, 1 GbE carries approximately 1.488 Mpps: 1,000,000,000 divided by 84 bytes x 8. The 84 bytes include a 64-byte frame, 8 bytes of preamble/SFD and 12 bytes of interframe gap. Verify the vendor's test conditions, multicast replication and feature limits.

MAC learning and multicast state

- A switch learns source MAC addresses by VLAN and port. If a destination is unknown, treatment depends on VLAN membership, policy and implementation. MAC table pressure can increase unknown-unicast flooding. DHCP renewal alone does not change a device's MAC address.
- Multicast group/source entries are separate from learned unicast MAC entries. Check IGMP tables, mrouter ports and the active querier when multicast reaches unwanted ports or disappears. Also check MAC moves and topology changes before changing aging timers.

Commissioning record

- Record link speed, peak traffic by direction, link errors, per-queue discards, MAC moves, group counts and test traffic. Reproduce symptoms with a known receiver set and isolate the congested path before changing switch parameters.

References

Niveo Broadcast & Data Centre portfolio

IETF RFC 4541, IGMP and MLD snooping considerations

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