ESSENTIALS OF MEDIA OVER IP

This course builds on IP Foundations for Media and equips broadcast and media professionals with the practical knowledge required to design, deploy, and operate media-over-IP systems. Participants deepen their understanding of networking, timing, control, and interoperability, progressing into key standards such as ST 2022 and ST 2110, PTP synchronization, SDP, and NMOS workflows. By the end of the course, learners are prepared to work confidently with scalable, standards-based ST 2110 infrastructures.

Target audience: everyone dealing with IP should have the basic knowledge presented in this training.

Format: E-learning

Duration: 3 hours

Pre-requisites

No particular prerequisites required.

Considerations

Multiple-choice assessment to validate understanding of key concepts

Agenda

This essentials of Media over IP training course contains the following sections:

1. IP Addressing & Subnetting for Media Networks

- IPv4 addressing fundamentals: network vs. host identification
- Subnet masks, network addresses, broadcast addresses, and usable host ranges
- Subnet calculations for common prefixes (/25, /26, /30, /31)
- Public vs. private addressing (RFC 1918), NAT, PAT, and the role of IPv6

2. Layer 2 & Layer 3 Networking Essentials

- Layer 2 communication fundamentals: MAC addresses and ARP resolution
- VLAN behavior: when traffic stays local and when routing is required
- The role of Layer 3: IP routing between networks
- Default gateways and off-subnet traffic forwarding
- Routing concepts overview: default, static, and dynamic routing
- Troubleshooting basic connectivity failures related to routing

3. Transport Protocols & Traffic Types

- TCP vs. UDP: reliability, latency, and delivery trade-offs

- Unicast, broadcast, and multicast traffic behavior in IP networks
- Why multicast is essential for professional media distribution

4. Multicast Operation in Media Networks

- IGMP fundamentals: group membership, reports, leaves, and queries
- IGMP snooping and its influence on multicast forwarding inside a VLAN
- PIM and multicast routing between subnets
- Managing high-bitrate media traffic: controlled multicast vs. unmanaged behavior
- Why static multicast routing or SDN-based control may be required in media fabrics

5. From SDI to IP: Media Transport Standards

- Industry transition from SDI-based infrastructures to IP-based media systems
- Overview of SMPTE ST 2022 and ST 2110 media-transport approaches
- ST 2022-6: encapsulated SDI over IP
- ST 2110: separate essence streams for video, audio, and data
- ST 2022-7 seamless protection switching for hitless redundancy

6. SMPTE ST 2110 Essentials for Media over IP

- Roles of the core ST 2110 documents:
    - ST 2110-10: system timing and synchronization
    - ST 2110-20 / -22: video transport
    - ST 2110-30 / -31: audio transport
    - ST 2110-40 / -43: ancillary data
- Why timing accuracy, traffic shaping, and interoperable audio matter

7. SDP for ST 2110 Systems

- Purpose of SDP in media-over-IP workflows
- Structure of an SDP file and key information for multicast streams
- Reading SDP descriptions for:
    - Single-leg ST 2110 video, audio, and ANC streams
- Comparing single-leg and ST 2022-7 dual-leg SDP behavior

8. Timing & Synchronization with PTP

- PTP fundamentals and its role in professional media systems
- PTP domains and Best Master Clock Algorithm (BMCA) selection
- PTP message types: announce, sync, follow-up, delay request, delay response
- Boundary-clock vs. transparent-clock switching behavior

9. NMOS: Discovery, Control & Management

- Purpose of NMOS in ST 2110 ecosystems
- Overview of key NMOS specifications for:
    - Discovery and registration
    - Connection management
    - Events, channel mapping, and system parameters
    - Authorization and device configuration
- NMOS registry architecture and controller-driven workflows
- Service discovery methods: mDNS, DNS-SD, and manual configuration

10. Interoperability & Operations

- JT-NM TR-1001-1 and the EBU Technology Pyramid
- Best practices for interoperable, manageable ST 2110 deployments
- Common control, orchestration, and management terminology
- In-band vs. out-of-band management in broadcast IP environments