



Broadcast Engineering and Media Technology Course: Studios, Playout, ST 2110 and Transmission



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Introduction:

Broadcast engineering and media technology for studios, payout, ST 2110 IP video and transmission is a 5-day course for teams that run TV and radio facilities, ending with a Broadcast Facility Technology Migration Plan for a case broadcaster. Facilities moving from SDI to IP lose air time when PTP timing drifts, NMOS control is half deployed, loudness complaints recur and contribution links lack a tested backup path. Nominees already operate or support studio, master control or transmission equipment and learn through inspection walkthroughs of facility drawings and logs. CoreConcept Training Center delivers this broadcast engineering and media technology course.

Course Objectives:

- Trace studio, outside broadcast and master control signal flow from camera and microphone to transmitter and streaming encoder
- Plan an SDI to SMPTE ST 2110 migration with essence separation, multicast addressing and NMOS IS-04 and IS-05 control
- Configure and verify a PTP timing plan to SMPTE ST 2059 with grandmaster, boundary clock and monitoring choices
- Operate media asset management and automated payout chains, including ingest, metadata, playlists and channel-in-a-box servers
- Apply EBU R 128 loudness targets and automated quality control to programme files and live channel output
- Design encoding, OTT, terrestrial and satellite delivery paths with SMPTE ST 2022-7 and site-level redundancy

Target Audience:

- Studio and outside broadcast engineering staff responsible for cameras, vision and audio mixers, routers and signal flow
 - Master control and payout engineering staff responsible for channel servers, automation and on-air monitoring
 - Network and IP media engineering staff responsible for switch fabrics, multicast, timing and device control
 - Transmission and contribution engineering staff responsible for encoders, terrestrial transmitters and satellite uplinks
 - Broadcast technology planning staff responsible for equipment lifecycle, migration projects and maintenance schedules
 - Media operations support staff responsible for ingest, archive storage and file-based quality checks
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Course Outline:

Day 1: Broadcast Facility Architecture and Signal Flow Baseline

- Studio, Gallery and Central Apparatus Room Signal Flow Mapping
- Outside Broadcast Truck and Fly-Away Kit Signal Paths
- SDI Formats, Embedded Audio and Reference Genlock Basics
- Radio Studio Chain From Microphone to Audio Router
- Facility Equipment Register and Lifecycle Condition Baseline

Day 2: SMPTE ST 2110 IP Video, NMOS Control and PTP Timing

- SMPTE ST 2110-10 System Model and Separate Essence Streams
- ST 2110-20 Video, ST 2110-30 Audio and ST 2110-40 Ancillary Data
- ST 2110-21 Sender Timing Classes and Switch Buffer Planning
- SMPTE ST 2059 PTP Grandmaster and Boundary Clock Design
- AMWA NMOS IS-04 Registry and IS-05 Connection Management

Day 3: Media Asset Management, Automated Playout and Loudness Control

- Ingest Workflow, Proxy Generation and MAM Metadata Schema
- Playout Automation Playlist, Secondary Events and Device Control
- Channel-in-a-Box Servers Versus Discrete Master Control Chains
- EBU R 128 and ITU-R BS.1770 Loudness Measurement Practice
- Automated File QC Profiles for Video, Audio and Captions

Day 4: Encoding, Contribution, Transmission and Redundancy Problem Cases

- Video Codec Selection, Bitrate Ladders and Adaptive Streaming Packaging
- Digital Terrestrial Transmitter Chain and Multiplex Capacity Planning
- Satellite Uplink Contribution Links and Link Budget Checks
- SMPTE ST 2022-7 Seamless Protection and Dual Network Paths
- Disaster Recovery Playout Site and Failover Test Schedule

Day 5: Inspection Walkthrough and the Broadcast Facility Technology Migration Plan

- Case Broadcaster Signal-Flow Drawing and Rack Layout Walkthrough
 - IP Fabric, Timing and NMOS Readiness Gap Register
 - Playout, Loudness and QC Monitoring Log Review
 - Delivery Path Redundancy Scoring and Failure Scenario Ranking
 - Broadcast Facility Technology Migration Plan Completion and Peer Review
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Skills You Will Gain:

- Broadcast Signal Flow Mapping
- IP Media Network Planning
- PTP Timing Verification
- NMOS Device Control Setup
- Playout Automation Support
- Loudness and File QC
- Contribution Link Engineering
- Broadcast Redundancy Design

Why Attend This Course:

- Hand a Broadcast Facility Technology Migration Plan for a case broadcaster to the head of engineering and the technology investment committee
- Decide which studios, galleries and playout chains move to SMPTE ST 2110 first and which stay on SDI with gateways
- Avoid off-air events, loudness complaints and stranded equipment spend caused by untested timing, control and backup paths
- Brief operators and maintenance shifts using the signal-flow maps, PTP checklist, loudness targets and failover test schedule

Conclusion:

Back at work, the participant presents the Broadcast Facility Technology Migration Plan to the head of engineering, the network operations lead and the channel operations manager. They use it to agree the order of studio and playout migration, the timing and control design, loudness and QC thresholds, and the redundancy tests each delivery path must pass. After the first migrated gallery or channel goes to air, the unit should review PTP alarms, NMOS connection faults, loudness exceptions, failover results and any off-air minutes, then update the plan.

Frequently Asked Questions FAQ:

What should participants know before the broadcast engineering and media technology course?

Participants should already operate or support studio, master control, network or transmission equipment and read basic signal-flow drawings. Familiarity with IP addressing helps on the SMPTE ST 2110 and PTP sessions; bringing a facility drawing or equipment list from work strengthens the walkthrough exercises.

How does broadcast engineering and media technology differ from broadcast media management?

This course covers the engineering of the facility: signal flow, IP video, timing, playout chains, loudness, encoding and transmission paths. Media management courses deal with programming schedules, audience measurement, editorial standards and advertising revenue, and production courses deal with shooting, lighting and editing content.

Why does PTP timing matter in broadcast engineering and media technology for ST 2110 facilities?

Without SDI reference cables, every ST 2110 sender and receiver aligns video, audio and ancillary streams using PTP timestamps. A poorly designed grandmaster, boundary clock or switch configuration causes lip-sync errors, dropped frames and switching glitches across the whole facility.

What do participants take back from the broadcast engineering and media technology course?

Participants take back a Broadcast Facility Technology Migration Plan for a case broadcaster, with signal-flow maps, an IP and timing readiness gap register, loudness and QC thresholds, delivery path redundancy scores and a failover test schedule they can adapt to their own facility.