ST 2110 Intensive Boot Camp - Comprehensive Syllabus

This intensive program is designed to assist individuals and organizations transitioning to a fully IP-based live production environment. Offering a high-level strategic overview of the transition, the course addresses key implementation challenges and explores various models for a successful shift to IP production.

Course 1: Introduction to IP Networking (ITIPN)

Description:
This 8-module course offers a strong foundation in IP networking, making it ideal for professionals new to the field while also serving as a comprehensive refresher for those with prior experience. By mastering essential concepts, participants will be well-prepared for further academic study or practical application in various industries.

The course covers the origination of IP networks from their early days to the modern internet. Participants will explore key components of IP networks such as connectors, cables, and network devices, and how these devices communicate within interconnected systems. Additionally, the course includes a specialized module on multicast technology that is critical for the media industry.

Learning Outcomes:
Upon successful completion of this course, participants will be able to:

1. Trace the history and evolution of telecommunications.
2. Understand the key concepts and components of telecommunication systems.
3. Explain the physical layer and its role in network communication.
4. Assess the functionality of the data link layer.
5. Analyze the significance of the network layer in telecommunications.
6. Identify and explain the key elements of multicast technology.
7. Describe the transport layer of the TCP/IP model.
8. Explore the application layer with examples such as DNS and RTP.

Module Topics:

1. History and Evolution of IP
2. Concepts, Models, and Standards
3. Layer 1 – The Physical Layer
4. Layer 2 – The Data Link Layer
5. Layer 3 – The Network Layer
6. Layer 4 – The Transport Layer
7. Layer 5 – The Session Layer

Course 2: Understanding SMPTE ST 2110 (Updated course)

Description:
This course provides a deep dive into SMPTE ST 2110 and its associated standards, focusing on practical

understanding and application. Engineers and technologists will learn the intricacies of video, audio, and data encapsulation, synchronization, traffic shaping, and redundancy in IP-based media workflows. Our team will lead participants through the theory and real-world challenges of deploying ST 2110 solutions.

Learning Outcomes:
Upon successful completion of this course, participants will be able to:

1. Differentiate between ST 2110 networking concepts from traditional SDI workflows, identifying key operational advantages and challenges.
2. Explain how to apply primary and advanced ST 2110 suite elements found in modern media workflows to real-world broadcast scenarios.
3. Design routing solutions using appropriate protocols and redundant multicast configurations for seamless transitions from SDI to IP.
4. Recognize properly configured Precision Time Protocol (PTP) elements to achieve reliable synchronization and redundancy using SMPTE 2022-07.
5. Apply effective audio stream management strategies that balance bandwidth efficiency and quality in both live and recorded IP-based environments.
6. Develop standard operating procedures for firmware management, packet monitoring, and documentation to enhance systematic troubleshooting in ST 2110 networks.
7. Identify methods to overcome cross-functional collaboration obstacles within teams bridging cultural and training gaps in IP-based broadcast settings.

Module Topics:

1. Introduction to SMPTE ST 2110
2. Beyond the Basics: Advanced Standards and RPs
3. Networking for ST 2110
4. Audio Essence Design and Management
5. Control and Troubleshooting in ST 2110 Systems
6. Operational Excellence and Future Trends

Course 3: Designing IP Networks (DIPN)

Description:
The network is the backbone of the entire IP media supply chain, from content creation to end-user distribution. This course examines the end-to-end process of planning, designing, deploying, and maintaining high-performance IP infrastructures for live production in studios, entertainment venues, sports arenas, and remote locations. Participants analyze the interaction of multiple network domains and study the standards, protocols, topologies, middleware, and application layers required to move real-time media with deterministic latency.

Throughout the course, engineers work in a peer community to test design assumptions and troubleshoot scenarios drawn from their own facilities, ensuring that theory is reinforced by practical problem-solving.

Learning Outcomes:
Upon successful completion of this course, participants will be able to:

1. Plan and design an IP-based media production network, incorporating relevant standards, protocols,

and security measures.
2. Build and configure a scalable, high-performance network tailored for live media production and distribution.
3. Document and maintain detailed network information, ensuring compliance with regulatory standards.
4. Monitor and support an IP media network, applying best practices for maintenance, cybersecurity, and cloud management.

Module Topics:

1. IP Media Supply Chain Overview
2. Network Design and Topology
3. Cybersecurity in IP Networks
4. Facility Design and Planning
5. Cloud Migration and Multi-Platform Distribution

TRAINING PROGRAM SUMMARY

Final Exam Details:
The final exam consists of 100 multiple-choice questions, rigorously designed to assess the knowledge and skills acquired throughout the program. Each exam attempt is two hours long, providing participants with ample time to complete it thoroughly. Participants are allowed two attempts to pass the exam, ensuring they have a fair opportunity to demonstrate their competency.

Program Overview:
This program offers an immersive learning experience in a dynamic environment led by industry experts, featuring hands-on practice and collaborative study groups to deepen participants' understanding. The comprehensive curriculum covers topics from foundational IP networking to advanced network design and SMPTE ST 2110 standards, equipping learners with the knowledge they need for real-world application.

Through practical insights and case studies addressing current industry challenges, participants will acquire skills directly applicable in professional settings. Upon completion, they will earn a respected certification that enhances career prospects and fosters professional growth in the media and broadcasting industry. By the end of the program, participants will have mastered essential IP networking principles and developed specialized expertise in SMPTE ST 2110 standards, positioning them as leaders in media technology.

Program Learning Outcomes
Upon successful completion of this program, participants will:

1. Demonstrate a strong understanding of IP networking, including its history, concepts, and network layers.
2. Design, build, and maintain IP-based media production and distribution facilities.
3. Implement and manage SMPTE ST 2110 standards in media production environments.
4. Apply cybersecurity principles to protect IP networks.
5. Navigate the shift from on-premise hardware to cloud-based models in media production.
6. Efficiently manage and troubleshoot IP networks, ensuring seamless media delivery.

Proficiencies Gained from the Program

Participants will gain the following proficiencies:

1. Mastery of foundational and advanced IP networking concepts.
2. Proficiency in designing, implementing, and maintaining IP networks tailored for media production.
3. Expertise in deploying and managing SMPTE ST 2110 standards.
4. Skills in configuring and securing network infrastructure.
5. Ability to troubleshoot and optimize network performance.
6. Knowledge of cloud-based solutions for media network architecture.
7. Engagement with ongoing professional development and networking communities.

The Boot Camp consists of three in-depth courses: Introduction to IP Networking, Understanding SMPTE ST 2110, and Designing IP Networks. Each course is led by expert technologists who will provide live online coaching sessions for each module with occasional participation of invited guest speakers. This training program is designed to provide knowledge and hands-on experience required to handle complex media network environments effectively.

At the conclusion of the program, participants will join a live wrap-up session with industry professionals, offering a valuable opportunity to discuss and resolve any remaining IP networking-related questions. Upon completing the program and achieving a passing score of 70% or higher on the final exam, participants will be awarded the SMPTE Certificate of Achievement for the ST 2110 Boot Camp. This certification is widely recognized across the industry and serves as a testament to the participants' proficiency and dedication to their craft.

Participants can now get more from the SMPTE ST 2110 Boot Camp Experience with a Practical Lab add-on! This hands-on, sandbox experience will allow participants to design, sync, and troubleshoot real-world live-production workflows using a simulated, virtual ST 2110 IP networking set-up.

This is the best way to immediately apply what is learned in Boot Camp and gain additional experience that can be applied in real-world scenarios. The lab is custom engineered by SMPTE and powered by in-kind gear from Lawo Academy, Arista, Blackmagic Design, Meinberg, Bridge Technologies, Matrox, AJA and other technology partners.