

Telecom Crash Course Syllabus

Chapter 1

Module 1-1: Welcome to the Telecom Crash Course. This module introduces the Telecom Crash Course, covering major objectives of the program as well as expectations of students.

Module 1-2: Logistics. This module explains the design of the Telecom Crash Course, the modular design of the program, and the various media used in the overall curriculum.

E-2: Industry Trends: This module examines the major trends that shape the telecom, media and technology sectors today.

E-3: Media Sector Overview: This module provides a broad perspective of the media sector, setting the foundation for later modules that dive deeper into high-level discussions offered here.

E-4: Telecom Sector Overview: This module provides a broad perspective of the telecom sector, setting the foundation for later modules that dive deeper into high-level discussions offered here.

E-5: Technology Sector Overview: This module provides a broad perspective of the technology sector, setting the foundation for later modules that dive deeper into high-level discussions offered here.

Module 1-3: Foreword. This module discusses the power of telecommunications and its evolving role in the global economy. It also presents an argument for studying not only telecom technology but also the *implications* of the technology and its impact.

Module 1-4: Protocols and Standards. This module defines protocols and standards and explains the differences between them. It also explains their role in telecommunications and the critical role that they play.

Module 1-5: Where do Standards Come From? As standards evolve in lockstep with the technologies that they define, they must match the evolving role of those technologies. This module introduces the organizations that create and manage standards development and the processes through which they are created.

Module 1-6: The Standards. This module introduces the actual publications that “house” international standards.

E-10: Open Source: Once considered nothing more than “hobby software,” Open Source has become a major business phenomenon, to the point that even Microsoft has stepped up to the Open Source plate. This module explores the history and future of what many refer to as “community programming.”

E-12: Overview of the Software Industry: Yes, it’s bigger than a bread box. The software industry has grown to mammoth proportions and commands a major portion of the IT and telecom spend. This module explores major trends in the software sector.

Module 1-7: Basic Terminology. This module introduces key terms and concepts that are required for all participants to understand the modules that follow.

Module 1-8: Analog Signaling. This module discusses analog signaling, the original (and still used) technique for representing data in an analog transmission environment.

Module 1-9: Digital Signaling. This module discusses digital signaling, the technique used for representing data in modern digital transmission environments.

Module 1-10: The Internet. Because it is such a critical element in modern telecommunications, this module discusses the Internet’s colorful history, its early development, its role in modern networks, and a bit (and only a bit) about the technology that underlies its remarkable capabilities.

Chapter 2

Module 2-1: Data Communications Systems and Functions. Here we introduce the basics of data communications including terminology and foundation-level knowledge.

Module 2-2: Binary Arithmetic Review. Because computers operate using base 2 rather than base 10, in this module we review the fundamentals of counting in base 2.

Module 2-3: Application Relationships. Continuing with the discussion started in Module 2-1, here we expand on the nature of data transmission and the capabilities required for it to execute properly.

Module 2-4: Introduction to OSI and Layered Protocols. The remainder of the chapter will be devoted to the study of the OSI Model, so in this module we introduce the Model and explain its structure, the relationship among the layers, and the reason we rely on a layered architecture.

Module 2-5: Layer Seven: The Application Layer. In this module we begin our study of OSI beginning with the uppermost layer of the model, responsible for the meaning or semantics of the transmitted message.

Module 2-6: The Presentation Layer. This layer is responsible for the form or syntax of the message, including such functions as compression, encryption and code conversion.

Module 2-7: Image Coding Schemes. Still images are typically compressed because they tend to be large files. Here we introduce coding schemes such as Windows Bitmap, JPEG, TIFF and GIF.

Module 2-8: Compressing Moving Images. Video can also be compressed, typically with schemes like MPEG. In this module we explain how it works and what the options are that control final video quality.

Module 2-9: Encryption. When data must be protected, encryption can be used. Techniques covered in this module include public and private key cryptography, as well as hash functions.

Module 2-10: The Session Layer. While it is the least known of the five layers, the session layer plays an important role in both session integrity and security, both of which are described here.

Module 2-11: The Transport Layer. Layer Four, the Transport Layer, is responsible for end-to-end, message oriented delivery. In this module we discuss switching and routing as well as the various service classes that exist at Layer Four.

Module 2-12: Switching and Routing Concepts. In this module we introduce the basics of message, circuit and packet switching, the evolution of the technologies, and the roles that they each play (or don't) in modern networks.

Module 2-13: Connection-Oriented Networks. For transmissions that must have the highest possible level of quality, a connection-oriented network is ideal. In this module we introduce the concept and its underlying technology.

Module 2-14: The Network Layer. The Network Layer is responsible for routing and congestion control. In this module we discuss the nature of these two issues and their role in the network, as well as the manner in which the Network Layer deals with them.

Module 2-15: Routing Protocols. Once the Network Layer has decided to move traffic across the network, it uses a variety of protocols to do so, including RIP, OSPF, BGP and a host of others. How they work and how they differ is covered in this module.

Module 2-16: Congestion Control. Congestion occurs when local delay has a global effect, and in this module we describe how it happens and how network protocols deal with it.

Module 2-17: The Data Link Layer. Layer Two concerns itself with framing the data packets so that they can be checked for errors and properly addressed to the next destination in the network.

Module 2-18: The Physical Layer. Layer One manages the physical representation of bits including electrical in a copper network, light in an optical network, and waveforms in a wireless network.

Module 2-19: Other Protocol Stacks. OSI isn't the only game in town, and in this final module we introduce TCP/IP as an alternative (and far more widely deployed) protocol stack for the transport of data packets.

Chapter 3

Module 3-1: Early Telephony History. Beginning in 1677 (!) this module walks through the evolution of the industry including the role of Western Union, the creation of the Bell Telephone Company and the American Speaking Telephone Company, the introduction of networking and the arrival of switching, and the breakup of the Bell System.

Module 3-2: Network Architectures. This module covers the post-Divestiture industry; the rise of Equal Access; the arrival of the Telecommunications Act of 1996.

Module 3-3: Basic Terminology. The similarity between the railroad industry (and railroad networks) and telephony networks is introduced, along with a brief discussion of high-level network functions.

Module 3-4: Tracing a Call. This module traces a call through the network at a high-level including the basic network elements – the phone, the local loop, local and long-distance calling; DTMF; the numbering plan; signaling functions (SS7); and the Advanced Intelligent Network (AIN).

Module 3-5a, b: A Tour of the Central Office. This two-part tour takes the participant through a typical central office (exchange), beginning with the cable vault and walking through the power room, the main distribution frame, the carrier environment and the switching environment. These two modules include clear and rich explanations of the functions of all CO elements.

Module 3-6a: Introduction to Voice Transport Basics. This introductory module is designed as a high-level overview of the material covered in Modules 3-6 through 3-13. For those participants who do not wish to dive into the details of carrier systems or SONET/SDH, this module provides an introduction to the concepts covered in the modules that follow.

Module 3-6: Voice Transport Basics. This module introduces the basics of voice transport including an introduction to T1, framing and formatting, the evolution of carrier systems from D1 to D4 Superframe to Extended Superframe. This module also introduces the European E1 standard.

Module 3-7: High-Speed Evolution. This module discusses the evolution in complexity from DS1 to DS3 and the challenges of transporting high-speed, multi-feed payloads. It also introduces SONET and SDH.

Module 3-8: SONET Evolution. In this module we discuss the evolution of SONET and the advantages it brings to the market: mid-span meet, improved OAM&P, multipoint circuit support, non-intrusive monitoring, and support for enhanced services. The module also introduces SONET overhead.

Module 3-9: SONET Essentials. Here we introduce the SONET frame, the differences between Optical Carrier (OC) and Synchronous Transport Signal (STS), payload vs. overhead, and the ability to build super-rate payloads.

Module 3-10: Sub-Rate Payloads. This module discusses SONET's ability to transport sub-rate payloads using Virtual Tributaries (VTs).

Module 3-11: Next-Generation SONET. SONET is a good platform, but Next-Generation SONET is even better. This module examines the additional capabilities that it brings to the networking world including Virtual Concatenation, Link Capacity Adjustment Scheme, and Generic Framing Procedure.

Module 3-12: Synchronous Digital Hierarchy. This module introduces SDH nomenclature and the structure of the SDH frame.

Module 3-13: SDH Overhead. This module explains SDH overhead and its various functions.

Module 3-14: Introduction to Voice Digitization. This module discusses the nature of voice, frequency division multiplexing vs. time division multiplexing and bandwidth allocation in multichannel voice networks.

Module 3-15: Voice Digitization Stages. Here we introduce the following concepts and functions: signal sampling, Pulse Code Modulation (PCM), companding in T1, and other digitization techniques.

Module 3-16: Introduction to VoIP. Here we discuss the early evolution of VoIP and the Skype application, one of the early success stories.

E-38: VoIP: Believe what you like, but the move to VoIP is a when, not a if question. This module explains VoIP in terms that make it clear that it is a force to be reckoned with.

Module 3-17: How VoIP Works. This module dissects the VoIP network and takes a look at each of the functional devices including the softswitch, the IP PBX, the gateway and the gatekeeper.

Module 3-18: Other VoIP Protocols. Here we discuss the role and function of H.323, RTP, SIP, and MGCP among others.

Module 3-19: Network Management. “That which gets measured gets managed” applies in networking as much as in any other business. Here we introduce QoS concepts, along with network management schemes such as TMN, CORBA and NGOSS.

E-27: Next-Generation Networks and Next-Generation OSS, Part 1: Part 1 defines the NGN and describes its fundamental elements.

E-28: Next-Generation Networks and Next-Generation OSS, Part 2: Part 2 examines NGN capabilities and features.

E-29: Next-Generation Networks and Next-Generation OSS, Part 3: Part 3 introduces the NGN Operations Support System (NGOSS) and describes its role within the NGN family.

E-30: Next-Generation Networks and Next-Generation OSS, Part 4: Part 4 looks at NGOSS functional anatomy and the standards-based models that it is built around.

E-31: Next-Generation Networks and Next-Generation OSS, Part 5: Part 5 introduces the Enhanced Telecommunications Operations Methodology (eTOM).

E-32: Next-Generation Networks and Next-Generation OSS, Part 6: Part 6 discusses the NGOSS SID model.

E-33: Next-Generation Networks and Next-Generation OSS, Part 7: Part 7, the final NGN module, examines the role of the NGN and discusses its future role as networks continue to evolve.

Chapter 4

Module 4-1: Computers. Here we dissect a typical computer and look at its component parts: the CPU, the ALU, main memory, secondary memory, and the bus that holds it all together. We also discuss the history of early computing.

E-6: The Green Data Center: Some analysts estimate that on average, data centers in North America consume 4% of the total power output of the region. This module provides an overview of power consumption in the IT space and offers thoughts on how to go green in the IT space.

E-35: Storage Trends: As network traffic becomes more media-dependent and as content does the same, the need to store it safely rises to a level of paramount importance. This module examines such storage trends as cloud storage, SaaS, and other major trends in the storage space.

Module 4-2: I/O Devices. Here we discuss the different input-output devices including the bus, the hard drive, tape drives, the evolution from the mainframe to the PC, the differences between application and operating system software, and introduce the Local Area Network (LAN).

E-7: The Semiconductor Industry: Not only is the semiconductor industry a fundamental component of all three TMT sectors, it also serves as a technological thought leader. This module provides an overview of the industry, its key players, and the challenges it faces. The module also provides an overview of the fascinating semiconductor manufacturing process.

E-8: Overview of the Server: So just what is a server, anyway? Find out here as we explore the roles, responsibilities and inner workings of one of the most important devices in the modern network.

E-13: The Processor Wars: Intel? Motorola? AMD? A manufacturer that no one has ever heard of? As demands for processing power and functionality increase, the battle between the major players heats up as well as each one attempts to eke that much more out of limited silicon real estate. This module explores the not-always-logical war between the key purveyors of processing power.

E-14: Virtualization: One of the hottest trends in the industry today, virtualization is all about operational efficiency. This module looks at the concept of virtualization and speaks to the advantages of moving toward a virtual solution in the data center.

Module 4-3: Introduction to LANs. Here we answer the question about the role of LANs and introduce their functional elements and an introduction to access schemes.

Module 4-4: Contention-Based LANs. In this module we introduce Ethernet, CSMA/CD, LAN segmentation, bridging, and LAN switching.

Module 4-5: Distributed Polling LANs. Here we discuss the concepts of distributed polling and IBM's Token Ring.

Module 4-5a: Introduction to Wireless LANs. This module examines the emerging family of technologies that provides users with the ability to access data resources over wireless facilities. Technologies discussed include WiFi, WiMAX, Bluetooth, HiperLAN, HiperMAN, and wireless LAN security considerations.

Module 4-6: Metro Ethernet. In this module we discuss metro area networks and the role that Ethernet plays there.

E-39: The Server Industry: A lot of companies have entered this game, and many more have yet to play. Servers represent a major component in the world of data transmission, and this module looks at their role.

Module 4-7: Content and Multimedia. In this module we discuss the evolution of still and moving images.

Module 4-8: Video. We begin with a fascinating discussion about the history of video development including the unlikely role of Bing Crosby.

Module 4-9: Modern Video Technology. In this module we discuss component t vs. composite video, color schemes, and signal vs. tape formats.

Module 4-10: TV Standards. There are so many of them floating around that we will take time here to describe the most important of them. We also discuss fields vs. frames, NTSC, PAL, SECAM, image quality, and screen formats.

E-16: The Entertainment Industry: It's not all "Hello to Hollywood" anymore, although that's a big part of the entertainment equation. This module explores the entertainment industry – its current status, its future, and the major trends affecting it.

E-11: Trends in Digital Rights Management (DRM): As the distribution of content has become more dependent on network transport, concerns over the protection of digital content and associated copyrights has risen to a significant level of importance. This

module explores current trends in DRM including the status of the Digital Millennium Copyright Act.

E-19: IPTV Overview: As IPTV finally comes into its own it is critically important to understand just what it is – and equally important, what it isn't. This module explores the IPTV phenomenon and offers a perspective on its role in the greater industry.

E-21: The Future of Broadcast TV: As television becomes less popular in the face of competition from more interactive media, advertisers begin to question the amount of money they're willing to commit to the medium. This module looks at the future of broadcast TV and offers some suggestions for ensuring that it actually *has* a future.

Chapter 5

Module 5-1: Access Technologies. This module provides an overview and introduction to the access technology marketplace.

Module 5-2: Introduction to DSL. This module offers an overview of DSL including architecture and nomenclature and an introduction to ADSL.

Module 5-2a: DSL Service Options. This module offers an overview of alternative service options including ADSL2, ADSL2+, HDSL, HDSL2, and VDSL.

Module 5-3: A Word About the DSLAM. This module provides a brief introduction to the DSL Access Multiplexer (DSLAM) and its role in the central office relative to the deployment of DSL services.

Module 5-4: DSL Market Issues. Like any product, DSL suffers from competition as well as technological challenges. This module discusses them in some detail in addition to their solutions.

Module 5-5: Cable-Based Access Technologies. Who would have guessed that a TV access technology from 1950 would become a contender for broadband delivery today? This module describes the cable market and its traditional network architecture.

E-15: Cable Modem Termination System (CMTS): The CMTS is to the cable modem what the DSLAM is to the DSL modem. If that makes sense, then you understand the gist of this module. Here we look at the device that terminates inbound traffic from customers who rely on a cable modem for their high-speed data connectivity requirements.

Module 5-6: The Modern Cable Network. In this module we present the evolution to digital cable and the advantages it offers to the industry – and the customer.

E-9: DOCSIS 3.0 and Tru2Way: The cable industry has evolved from a one-way, entertainment-only industry to the provider of not only broadcast content but interactive services as well. The industry's VoIP and high-speed data offerings are forces to be reckoned with, and the latest standards give them even more market power. This module explores DOCSIS 3.0 and Tru2Way, the latest standards that govern cable's high-speed data offerings.

E-25: The Content Industry: This module examines the technological forces that are shaping the industry.

Module 5-7: Wireless Access Technologies. Wireless access holds enormous promise. In this chapter we describe its developmental history.

Module 5-8: Cellular History Overview. This module reviews basic radio technology before completing the story of its fascinating history, culminating in the arrival of cellular technology.

Module 5-9: Introduction to Cellular Telephony. Cellular telephony has redefined the concept of communication. This module describes how it works, including an introduction to access technologies – FDMA, TDMA and CDMA.

Module 5-10: Introduction to CDMA. This module describes the operating principles of CDMA.

Module 5-11: Introduction to GSM. This module describes the history and operating principles of GSM before taking a “field trip” to a wireless experience in Africa in the following module.

Module 5-12: Thoughts on Global Telecom. A brief aside: In this thought-provoking module we consider the impact of wireless telephony with a focus on Africa.

Module 5-13: The Access Evolution. Wireless access has evolved through three or four critical technology generations on its journey to the present state of wireless communications. This module describes the evolution from first generation to fourth generation systems.

Module 5-14: Third Generation Systems – and Beyond. 3G is the current buzzword in the industry, but 4th generation systems are not far away – in fact, many argue that they’re already here. This module offers insights into the future of the wireless world.

E-34: Wireless Futures: Hold on tight: It isn’t about CDMA and GSM anymore, because an entire range of technologies are just appearing over the horizon that offer orders of magnitude more capability than these technological mainstays. This module looks into the future and discusses UMTS, LTE, WiMAX and other key technologies that wait to ascend to the wireless throne.

Module 5-15: Wireless Broadband Access Options. 3G isn’t the only game in town; there are a number of other options out there including freespace optics, Bluetooth and a number of others. Here we describe them and their future.

E-17: IMS Overview: There are as many explanations for what IMS is as there are people attempting to craft those explanations. This module takes a no-nonsense look at the fascinating world of IMS and attempts to make sense of what is unquestionably one of the most important technological phenomena we have ever seen in the world of telecom.

Module 5-16: Introduction to RFID. The newest addition to the wireless application set, RFID is certainly among the most intriguing of wireless applications. This module describes what it is and how it works.

Module 5-17: RFID Applications. This module describes the most common applications for RFID, including some sobering statistics about its potential impact.

Module 5-18: Satellite Technology. Believe it or not, it all started in 1945 with Arthur C. Clarke – and look where satellite is today. This module describes the most common forms of satellite technology and their application in modern communications.

Module 5-19: WiFi. How could we ignore WiFi, the most pervasive data application of all? This module explains its inner workings and the applications it enjoys.

Module 5-20: Overview of WiMAX. The on-again, off-again love affair that the industry has with WiMAX is worthy of tabloids. Nevertheless, it offers great promise. In this module we explain what it is and how it works – and where its future may lie.

Module 5-21: Other Wireless Developments. The industry isn't limited to the technologies already described; others emerge seemingly weekly. This final chapter describes Ultra-Wideband, Zigbee, and others.

Chapter 6

Module 6-1: Introduction to Transport. In this first module of Chapter 6 we discuss the nature of transport and begin with a discussion of point-to-point technologies.

Module 6-2: The Switching Hierarchy. This module describes the hierarchy of switching types and introduces frame relay.

Module 6-3: Service Management in Frame Relay. Frame relay is not the most sophisticated network transport scheme, but it does have a few tricks up its sleeve in terms of how it manages QoS and congestion. Both are discussed in this module.

Module 6-4: Introduction to Asynchronous Transfer Mode (ATM). ATM has been around for a long time, and even though it is now starting to give way to Ethernet and other high-speed options, it is still important. This module introduces it and its evolution.

Module 6-5: ATM Technology Overview. This module explains in some detail the ATM protocol stack and the roles of the fields in the ATM header.

Module 6-6: Addressing in ATM. ATM uses a unique combination of address elements to set up flows between users. This module explains how it works before describing ITU-T and ATM Forum service classes.

Module 6-7: Introduction to Optical Networking. This introductory module discusses the early history of optical networking, the fundamental elements of an optical network, and the initial manufacturing stages of optical fiber.

Module 6-8: The Shuji Nakamura Story. Credited with inventing the light emitting diode against almost insurmountable odds, Nakamura's story is one of the most interesting and uplifting you will read. This module tells the story.

Module 6-9: From Preform to Fiber. Module 6-9 describes the process of drawing the fiber from the mass of molten glass before introducing the first transmission impairments we will encounter in optical systems, scattering and dispersion.

Module 6-10: Other Optical Nonlinearities. Scattering and dispersion are only two of the impairments that crop up in optical systems. Others, including various waveform interference effects, are described in this module.

Module 6-11: Scattering Problems and Solutions. Stimulated Brillouin Scattering and Stimulated Rayleigh Scattering are vexing problems for optical systems; this module describes them and solutions for them.

Module 6-12: Optical Amplification. This module discusses techniques used to amplify optical signals without converting first to electrical. Topics covered include Erbium-Doped Fiber Amplifiers (EDFA) and Raman amplification.

Module 6-13: Optical Receivers. In this module we discuss the various types of photodetectors including PIN and Avalanche Photodiodes.

Module 6-14: Fiber Types. Module 6-14 describes the differences between multimode and single mode fiber types.

Module 6-14a: Optical Manufacturers. The number of companies manufacturing optical components is about as large as the number of devices they manufacture. This module examines the companies that manufacture optical switches, lasers, photodetectors, optical amplifiers, and optical fiber.

Module 6-15: DWDM. This module explains the principals behind Wavelength Division Multiplexing systems, which provide the ability to transport multiple optical signals down a single fiber.

Module 6-16: Optical Switching and Optical Routing. This brief module explains the concepts behind optical switching.

Module 6-17: A Trip to the Wave Venture. This final module in the chapter is a “virtual tour” of a cable laying ship in Singapore.

Module 6-18: The Battle Between FiOS and LightSpeed. In this module we compare Verizon’s and AT&T’s very different approaches to optical networking.

Module 6-19: GPON. One of the newest additions to the optical networking world, GPON is becoming a critical addition to networking architectures. In this module we explain what it is and how it works.

Chapter 7: IP, the Internet and MPLS

Module 7-1: The History of the Internet. This module looks at the Internet's origins from its beginnings in 1968 to its structure today.

Module 7-2: Managing the Internet. A number of organizations oversee the development, architecture, and capabilities of the modern Internet. This module explains the role of these organizations and the interplay among them.

Module 7-3: TCP/IP: What it is and how it Works. TCP/IP is a layered protocol like the OSI Model. However, it is specifically designed to serve in packet networks and is the heart of the modern Internet – as well as any number of other networks. This module explains its structure and inner workings as the most important protocol on the planet today.

Module 7-4: Understanding IP Addresses. This module explains the IP addressing scheme and how it is used in the routed world. Topics covered include address classes, subnet masking, related protocols (CIDR, DHCP, NAT, etc.), DNS, and address resolution.

Module 7-5: Routing in IP Networks and IPv6. Routing protocols are critical to the functionality of IP networks; the principal protocols are discussed briefly here, along with the evolution of IPv6 and an introduction to transport layer protocols in TCP/IP.

Module 7-6: The Transmission Control Protocol (TCP). This module explains the role of TCP in the TCP/IP suite.

Module 7-7: The User Datagram Protocol (UDP). This module explains the role of UDP in the TCP/IP suite.

Module 7-8: Multiprotocol Label Switching (MPLS). MPLS has become the primary core protocol for guarantees of QoS in IP networks. This module examines its structure and functionality.

Chapter 8: Regulation

Module 8-1: Telecommunications Regulation. This one-module chapter looks at current issues in regulation as well as the roles and responsibilities of regulatory bodies around the world.

Module 9: Program Summary and Closing Thoughts

Module 9-1: This final module, recorded at Telecom Italia's Futures Centre in Venice, offers some concluding thoughts about the world, the industry and the Executive Crash Course program.

Enrichment Modules for Future Study

E-18: Security Overview: This module looks at the increasingly urgent role of security in today's business world. Included are discussions of issues associated with both data-at-rest (stored) and data-in-flight (being transmitted) and solutions to the most important security challenges.

E-20: Interactive Gaming Trends: Beginning back in the early 1960s (hard to believe, isn't it?) the gaming industry has grown into a juggernaut that controls not only entertainment spend but an increasing percentage of the ad spend as well. This module takes a birds' eye view of this remarkable industry and sets the stage for later modules that examine details of its inner workings.

E-22: The Future of Publishing: 50% of North Americans don't read for pleasure, and only slightly more read as part of the day-to-day process of staying informed about their own business. So what's the future of publishing? Will it be around in another decade? This module examines the future of the industry and provides some thoughts on where it's going.

E-23: The Future of Music Distribution: "It was such a simple business until Apple came along." How true: today, Apple is the largest music distributor in history and growing. So what's the future of traditional CD-based music distribution? Log on and find out.

E-24: Content Market Overview: Content is different things to different people, which makes the sector rather intriguing to define. TV, music, e-mail, voice calls, software, video games, and many other elements make up the content business. So where is it going? Find out in this module that attempts to get its arms around the future of a very lucrative business sector.

E-25: The Content Industry: This module examines the technological forces that are shaping the industry.

E-26: The Millennials: Capturing the essence of the Millennials in a 20-minute module is like trying to capture particle physics on the back of a napkin. The Millennials, defined as people born between 1982 and 2004, are the largest generation that has ever lived on the planet. As a consequence they deserve our serious attention as they enter the workplace and begin spending money.

E-36: 21st Century Advertising: This is perhaps one of the most interesting of all areas of study within the media-related space. Advertising commands not only the attention of buyers, but their money, as well. This module examines the direction that advertising

is taking and looks to the future – and a very different interaction between buyers and sellers.

E-37: Unified Communications: The ability to unify communications modalities as a way to improve the efficiency of the organization is the focus of this module.

E-40: The Converged Handset: The handset is much more than a phone today – it's a full-blown multimedia, data-ready device. This module looks at the handset of the future and examines some of the fascinating technologies that are finding their way into these multifunctional devices.