

# **Video Security Systems Technician**

# NICET

## **Level IV Certification**

### **Content Outline**

National  
Institute for  
Certification in  
Engineering  
Technologies



# Introduction

The purpose of this certification program is to recognize the professionalism of qualified technicians and provide a way for others to distinguish those technicians who have demonstrated job knowledge and work experience. NICET will do this by defining and testing relevant knowledge and evaluating experience.

This document presents the content that is covered in the examination and other criteria for certification as a Video Security Systems Technician at Level IV. This program is based on an analysis of the tasks that are performed by a competent technician. The content outline is a listing of tasks that should be performed well by a Level IV certified Technician. Also included are knowledge and skills needed to succeed at each task. These tasks are the focus of the test questions that make up the Level IV exam.

The tasks are grouped into larger areas of responsibilities, or “domains”. The domains are:

- Project Planning
- System Installation
- System Testing and Commissioning
- Troubleshooting
- Planning and Conducting User Training (No tasks at Level IV)
- Documentation
- Project Management

A general description or profile of a Level IV Technician includes the following characteristics:

**Education:** Minimum expected for Level III, with coursework or other experiences that develop a broad knowledge of security and other related systems, computer networking, security industry procedures, and governmental requirements. (No specific education requirement for certification.)

**Work Experience:** Minimum experience required for Level III plus three years of installation, maintenance, troubleshooting, and project management work (each of the years involving significant hours in VSST Primary Activities and most other hours in VSST Related Activities) and major project responsibilities. One year of the work experience as a VSS Technician must have been acquired within the three-year period prior to the date the certification at this level is awarded. (An Electronics Associates Degree from an ABET accredited program may be substituted for 18 months of work experience.)

**Responsibility:** Install and troubleshoot type C systems. Provide project management for single or multiple installations, including assignment and supervision of personnel.

**Acquired Competencies:** In addition to Level III competencies, perform installation and testing of type C systems. Provide supervision and technical support to other technicians. Troubleshoot complex problems, including control elements. Provide project management.

# **Tasks Performed by the Level IV Technician**

*(Installs Type C Systems, in addition to A and B)*

## **4.1 “Project Planning” Tasks**

### **4.1.1 Perform site assessment for installation of a type C system.**

Knowledge:

Functions and interoperability issues of video and other building systems to be integrated  
Site requirements for UHF and microwave radio transmission

Skills:

Collect information required for FCC licensing of radio transmission systems.  
Determine correct communications protocols necessary to integrate existing equipment.

### **4.1.2 Evaluate networked type C systems for value-added engineering changes.**

Knowledge:

Functions unique to type C systems and the equipment needed to produce those functions

Skills:

Recognize opportunities to improve system functionality.

### **4.1.3 Verify that regulatory approvals have been obtained.**

Knowledge:

Relevant FCC transmission requirements  
What approvals are necessary for various integration and communication equipment, systems, operations, or procedures

Skills:

Locate and recognize approvals.  
Determine whether the approval covers the work to be done.

### **4.1.4 Coordinate planning of delivery, acceptance, and connection requirements with suppliers of peripheral equipment and providers of communications services.**

Knowledge:

Functions of various communications technologies  
Methods for establishing communications between system components

Skills:

Communicate with others in oral and written form.  
Determine the individuals responsible for various equipment, interface connections, or functions.

## **4.2 “System Installation” Tasks**

### **4.2.1 Coordinate the integration of equipment from other systems and/or manufacturers.**

#### Knowledge:

Requirements of RS-232, RS-422, RS-485 interface standards, and TCP/IP protocols

Basic terminology and requirements of Ethernet, ATM (Asynchronous Transfer Mode), Token Ring, and Sonnet networks with respect to the following:

- Wiring requirements and topology
- Bandwidth issues
- Capabilities and limitations

#### Skills:

Determine the individuals responsible for various equipment, interface connections, or functions.

Communicate with the IT and telephone personnel of the client.

Apply RS-232, RS-422, RS-485 interface standards, and TCP/IP protocols to system integration situations.

Research requirements of auxiliary equipment for bi-directional communications.

Operate a breakout box.

### **4.2.2 Install, connect, and verify communications between integrated equipment.**

#### Knowledge:

Possible interactions of CCTV systems with the following systems:

- Access Control
- Burglar Alarms
- Fire Life Safety
- HVAC
- Intercom

#### Skills:

Identify incompatibility problems.

#### **4.2.3 Install, connect, and verify operation of point-to-point wireless transmission systems.**

Knowledge:

Equipment mounting requirements

Transmitter-to-receiver transmission requirements

Skills:

Operate wattmeters and field-strength meters to confirm optimal alignment.

Align transmitters and receivers for maximum transmission.

#### **4.2.4 Install, connect, and verify operation of communications for remotely operated systems.**

Knowledge:

Telephone interface and transmission issues

Communication factors affecting picture quality and transmission speed

Skills:

Use terminology and concepts related to communications technology to communicate with telecommunications personnel with regard to system requirements.

### ***4.3 “System Testing and Commissioning” Tasks***

#### **4.3.1 Program recording devices for remote access.**

Knowledge:

Generic programming requirements for digital recorders as they relate to network interfacing and controller set-up

Skills:

Read manufacturer’s documentation and specifications to determine the programming requirements of recording devices with remote access and apply to particular applications.

Read and interpret system plans as they relate to networks and multi-site applications.

Use portable monitors and hand-held video meters in programming recording devices.

#### **4.3.2 Optimize head-end equipment for operation with networked and remote equipment.**

Knowledge:

Indicators of proper and of improper functioning of type C head-end equipment

Principles of fiber technology relevant to transmission of signals between head-end and networked or remote equipment, including fiber loss budgets and decibel losses

Skills:

Operate head-end equipment to test the full range of functions related to networked and remote equipment.

### **4.3.3 Optimize functioning of recording devices at all networked or remote locations.**

Knowledge:

Indicators of proper and of improper functioning of remote recording devices

Skills:

Read and interpret manufacturers' instructions.

Operate remote recording devices to test the full range of functions related to networked and remote location.

### **4.3.4 Verify that all I/O interfaces with head-end equipment and other required I/O devices are operating correctly and that communications meet all IT and telecommunications requirements.**

Knowledge:

Indicators of proper and of improper functioning of I/O interfaces

Impact of bandwidth utilization

Skills:

Read and interpret the site survey for safety hazards.

Read and interpret system plans to verify that each input and output device is tested and performs as expected.

### **4.3.5 Verify that all video and data communication equipment are operational and meet regulatory requirements.**

Knowledge:

Indicators of proper and of improper functioning of external video and data communication equipment

Applications for which a standard, regulation, or guideline in the NEC, BICSI, IEEE, CSI, UL, SIA Privacy, or FCC is relevant

Skills:

Read and interpret the site survey for safety hazards.

## ***4.4 “Troubleshooting” Tasks***

### **4.4.1 Identify and communicate LAN/WAN problems to IT personnel.**

Knowledge:

Network terminology

Network operations and data transmission formats

Skills:

Use a computer to check for data transmission over the LAN/WAN.

Communicate information clearly to the appropriate IT personnel.

#### **4.4.2 Identify hardware incompatibilities.**

##### Knowledge:

Functions of and data transfer pathways among hardware components, including cabling and connectors

##### Skills:

Read and interpret manufacturers' specification materials.

Determine the requirements of various hardware components for, and limitations on, compatibility with other components, and whether those requirements have been met.

#### **4.4.3 Troubleshoot PC problems, including hardware, software, and communications issues.**

##### Knowledge:

PC operations: Boolean operations, generic language-based programming structures (loops, conditional branching, I/O calls, etc.), memory (types, monitoring, transferring, backing-up, etc.), and communications (devices, drivers, ports, communications programs, accounts, security, etc.)

Data formats, data communications protocols, and addressing schemes

##### Skills:

Manage files, folders, and directories, transfer files, install and manage devices and programs.

Test system operations and use system diagnostics in DOS<sup>®</sup>, Windows<sup>®</sup> 98, 2000, XP, NT, and Linux to determine the source of and, where possible, the remedy for PC problems.

#### **4.4.4 Troubleshoot data communications.**

##### Knowledge:

Functions of the major components of a computer and how they communicate with each other, as well as binary, octal, and hexadecimal number representation, addressing schemes, and memory organization

RF terminology, principles and applications, as well as the functions and requirements of RF devices

Networking terminology, principles, protocols, software functions, and cabling and connection requirements.

##### Skills:

Test for signals in the signal path.

Determine the data communications programs, protocols, formats, and pathways being used within a system.

#### **4.4.5 Troubleshoot IP and hardware address conflicts.**

Knowledge:

Locations of IP and hardware addresses and how they can relate to each other

Functions of the major components of a computer and how they communicate with each other, as well as binary, octal, and hexadecimal number representation, addressing schemes, and memory organization

Skills:

Determine the correct address for various locations and check whether stored or transmitted addresses are correct.

#### **4.4.6 Troubleshoot wireless and infrared communications.**

Knowledge:

Types of RF and IR interference

Signal strength measurement methods and meaning of results

Structure and important characteristics of antennas and feed lines

Structure, functions, and important characteristics of infrared emitters and receivers

Skills:

Measure signal strength and determine whether it is sufficient.

Identify RF interference and determine its characteristics and source.

Identify the type of antenna and its feed lines.

Identify IR interference and determine its characteristics and source.

Identify the type and characteristics of an IR emitter and receiver.

Identify a malfunctioning component.

### ***4.5 “Planning and Conducting User Training” Tasks***

No tasks at this level



## **4.6 “Documentation” Tasks**

*Note: The letters following some tasks indicate for whom the documentation is required:*

*S = Shop, C = Customer, G = Government*

### **4.6.1 Record the assigned functions of digital memory and network addresses. (SC)**

Knowledge:

Purposes and intended users for this information

IP addressing conventions

Skills:

Determine how various addresses are used.

Record the information in a clearly understandable and well-formatted document.

### **4.6.2 Record the system plans and access codes. (SC)**

Knowledge:

Purposes and intended users for this information

Uses of various types of plans and access codes

CSI Division 1, Section 1700

Skills:

Record the information in a clearly understandable document in accordance with CSI format.

### **4.6.3 Save backup copies of software, databases, and user programming.**

Knowledge:

Which data is essential for proper system backup

Skills:

Generate backup copies of files and software using DOS<sup>®</sup>, Windows<sup>®</sup> 98, 2000, XP, and NT.

Store copies in a location appropriate for the application.

### **4.6.4 Collect information from IT and telecommunications departments for preparation of as-built.**

Knowledge:

What IT and telecommunications information is required for as-built records

How this information is to be recorded

CSI Divisions 1 and 28

Skills:

Compile and verify the information and direct its incorporation into as-built records.

## **4.7 “Project Management” Tasks**

### **4.7.1 Develop Gantt charts and record progress of project.**

Knowledge:

Gantt charts and how to use them

CSI Divisions 1 and 28

Skills:

Organize Gantt charts, make entries, assign personnel and resources, and provide printouts of the project to management, subcontractors, and other trades.

Estimate the time required for various operations.

Record progress of the project.

### **4.7.2 Maintain log of project progress.**

Knowledge:

Appropriate contents of the project log

Skills:

Determine labor completed and materials expended.

Communicate and record proceedings clearly in writing.

### **4.7.3 Prepare and submit itemized cost information for project billing.**

Knowledge:

Contents of an itemized bill

How to determine costs, as well as any restrictions on the costs, for each item.

Skills:

Organize information for the billing.

Determine timing and procedures for billing.

Communicate clearly in writing and verbally to gather and present billing information.

#### **4.7.4 Allocate resources in accord with overall budget.**

##### Knowledge:

How all the material and labor accounts for the project combine into a total budget

Allocation of project costs to various phases of the job, such as rough-in, cable pulling, field device, head-end termination, testing/commissioning, etc.

CSI Divisions 1 and 28

##### Skills:

Develop procedures for recording spending on each phase of the project over time.

Use appropriate documents to determine the project objectives and the components, materials, and labor needed to meet the objectives.

Use paper and electronic media to determine costs of components and materials.

Develop and present complete and properly formatted reports of budget revisions and of actual cost vs. budget.

Communicate clearly in writing and verbally to gather and present budget information.

# **NICET Video Security Systems Classification**

*The following are some of the types of equipment and system characteristics that delineate “Type A,” “Type B,” and “Type C” systems, as referred to in this content outline.*

## **Type A Systems**

*These are basic systems with standard components, low bandwidth transmission, and menu-driven setup, such as:*

Multiplexer/VCR

Quad/VCR

Digital video recorders with time/date, play/record, and anti-tamper functions

Sequential switch

Single keyboard

Indoor/outdoor

Standard cable runs not requiring repeaters or amplifiers (less than 800 ft. for coaxial; less than 1500 ft. for twisted pair)

## **Type B Systems**

*These systems can include specialized components, programmable controls, and high-bandwidth transmission, such as:*

PTZ

Multiple keyboards

Matrix interfaced with alarms, A/C, or intercom (GPI or dry contact)

Digital video recorders with programmable, alarm-based resolution and frame rate

Fiber transmission systems

Low light

Long cable runs

Covert or portable systems

RF modulators

## **Type C Systems**

*These systems can include PCs, serial communication, and wireless transmission, such as:*

Integrated systems/serial communications/GUIs

LANs/WANs

Remote systems

Microwave and IR transmission

Digital video recorders with remote interface

# **Acronyms and Abbreviations**

## **Codes and Standards**

ASTD	American Society for Training and Development
BICSI	Building Industry Consulting Service International
CSI	Construction Specification Institute
FCC	Federal Communications Commission
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SIA	Security Industry Association
UL	Underwriters Laboratories

## **General**

AGC	Automatic Gain Control
ATM	Asynchronous Transfer Mode
dB	deciBel
DHCP	Dynamic Host Configuration Protocol
DSL	Digital Subscriber Line
DSS	Digital Slow Shutter
DVD	Digital Video Disk
DVM	Digital Volt Meter
DVR	Digital Video Recorder
GLC	Ground Loop Correction
HD	High Density
HVAC	Heating, Ventilating, and Air Conditioning
I/O	Input/Output
IR	InfraRed
IRE	Institute of Radio Engineers (unit of measure)
ISDN	Integrated Services Digital Network
IT	Information Technology
LAN	Local Area Network
MATV	Master Antenna TeleVision
OTDR	Optical Transducer Directional Reflectometer
PIR	Pulsed InfraRed
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RAID	Redundant Arrays of Inexpensive Disks
SONET	Synchronous Optical Network
SVHS	Super Video Home System
UHF	Ultra High Frequency
VCR	Video Cassette Recorder
VHF	Very High Frequency
VHS	Video Home System
VOM	Volt-Ohm Meter
WAN	Wide Area Network