

**BULLETIN 2000-09****Date: March 22, 2000**

U.S. Department of Labor Employment and Training Administration Office of Apprenticeship Training, Employer and Labor Services (OATELS) Washington, D.C. 20210	<u>Distribution:</u>  A-541 Headquarters A-544 All Field Tech A-547 SD+RD+SAC+; Lab.Com	<u>Subject:</u> Internetworking Technician  <u>Code:</u> 200
Symbols: DSNIP/SDO		Action: Immediate

**PURPOSE:** To inform the Office of Apprenticeship Training, Employer and Labor (OATELS), Bureau of Apprenticeship (BAT) Staff of a new apprenticeable occupation.

Internetworking Technician  
O\*NET Code: 15-1081.00  
RAIS Code: 1038  
Training Term: 5000 Hours  
Type of Training: Time - based

**BACKGROUND:** Request for apprenticeability consideration for this occupation was submitted by John B. McDowell on behalf of the Communication Workers of America (AFL-CIO, CLC), Washington, DC.

A suggested work process schedule and outline of related instruction are attached.

This occupation will be added to the Bureau's list of recognized apprenticeable occupations. For further information, contact ATR Steven D. Opitz.

**ACTION:**

NOTE: This Bulletin is being sent via Electronic-Mail (E-Mail). Bureau State Directors should provide copies to their SAC partners as appropriate.

Attachment

**ON THE JOB TRAINING SCHEDULE (OJT)**  
**INTERNET WORKING TECHNICIAN**  
 RAIS CODE: 1038 O\*NET CODE: 15-1081.00

The Internetworking Technician is a highly skilled technician responsible for the effective installation, maintenance and operation of advanced data networking products, routers, hubs, and switches in an integrated data/voice network. Individual will install terminal transmission products such as modems, channel service units and interface applications. In addition the candidate will provide On-premise and Network Operation Center maintenance support and resolve maintenance problems through the interpretation of diagnostic results and system tests.

Different manufacturers of advanced data network equipment require certifications on their equipment in order to effectively configure their products. Education and training on these devices will be continuous for the technicians in this field as technology continues to change.

**A. Data/Voice Cable Installation and Termination 400 Hours**

1. Safety Demonstration Throughout Performance is Required
2. Building Code Requirements and Floor Plans
3. Cable and Wire Installation Using Floor Duct, Conduit, Stud
4. Drilling and Associated Tools and Equipment Cable and Wire
5. Termination Using Industry Standard Material,
6. Equipment and Color Code
7. Basic Electrical Theory and Print Reading

**B. Computers, Installation, Maintenance and Troubleshooting 600 Hours**

1. Maintenance and Installation of Personal Computers
2. Maintenance and Installation of PC OS Software
3. Installation of Network PC's and Software
4. Installation of Network Hardware Including Modems and
5. Concentrators OS Configuration and Administration  
(Novell and Windows NT)

**INTERNET WORKING TECHNICIAN**  
RAIS CODE: 1038 O\*NET CODE: 15-1081.00  
**ON THE JOB TRAINING SCHEDULE (OJT) (Continued)**

- C. Installation and Maintenance of Internetworking** **2000 Hours**
1. Components, Switches and Routers. Basic Internetworking Instruction and Familiarity
    - a. LAN Devices
    - b. WAN Devices
    - c. OSI Model
    - d. AN Technologies
  
  2. LAN Introduction and Familiarization
    - a. Segmentation
    - b. Full and Half Duplex
    - c. Ethernet
  
  3. TCP/IP Protocol and Addressing
    - a. DOD Reference Model
    - b. IP Addressing Resolution
    - c. Subnetting
  
  4. Basic Router Installation
    - a. Router Startup
    - b. User Interface
    - c. Designing Internetworking
    - d. Static, Default and Dynamic Routing
    - e. Interior Routing Protocols
    - f. Exterior Routing Protocols
  
  5. Basic Router Configuration
    - a. Sources for Cisco IOS Software
    - b. Cisco IOS Commands
    - c. Accessing Other Routers
  
  6. Basic Wide Area Work Instruction
    - a. Plain Old Telephone (POTS)
    - b. Synchronous Data-link Control (SDLC)
    - c. High-level Data-Link Control (HDLC)
    - d. Dial-On-Demand Routing (DDR)
    - e. X.25
    - f. Frame Relay
    - g. Point-To-Point (PPP)
    - h. ISDN

<b>D. Advanced Internetworking Installation and Maintenance</b>	<b>2000 Hours</b>
1. Installing, Configuring, Operating and Troubleshooting <ul style="list-style-type: none"> <li>a. Complex Routed LAN, Routed WAN, and Switched LAN</li> <li>b. Networks and Dial Access Services.</li> </ul>	
2. Understanding Complex Networks, such as, but not limited to, IP, IGRP, IPX, Async Routing, Apple Talk, Extended	
3. Access Lists, IP RIP, Route Redistribution, IPXRIP, Route <ul style="list-style-type: none"> <li>a. Summarization, OSPF, VLSM, BGP, Frame Relay, ISDN,</li> <li>b. ISL, X.25, PSTN, PPP, VLANs, Ethernet, ATM, Access</li> <li>c. Lists, 802.10, FDDI, and Transparent and Translational Bridging.</li> </ul> Maximizing performance Through LANs, Routed WANs, and Remote Access.	
4. Provide Access Security to Network Switches and Routers.	
5. Provide Increased Switching and Routing Bandwidth - End-to-End Resiliency Services.	
6. Provisioning Custom Queuing and Routed Priority Services.	
<b>TOTAL HOURS</b>	<b>5000</b>

**RELATED TECHNICAL INSTRUCTION (RTI)**

<b>A. Cable Installation Component</b>	<b>40 Hours</b>
1. (Based on BICSI Training Standards) <ul style="list-style-type: none"> <li>a. Background Information</li> <li>b. Industry Orientation</li> <li>c. Structured Cabling Systems</li> <li>d. ANSI/TIA/EIA Standards</li> <li>e. Blueprint Reading</li> <li>f. Media (Shielding, Unshielded, Co-Ax) Connectorization</li> <li>g. Transmission (Power, Frequency and Analog, Copper Fiber)</li> <li>h. Grounding and Bonding Common Safety Practices (First Aid, Protective Environs) Professionalism (Appearance)</li> </ul>	
2. Planning <ul style="list-style-type: none"> <li>a. Drawings</li> <li>b. Material Lists</li> <li>c. Scope of Work</li> <li>d. Contract</li> <li>e. Project Schedule</li> <li>f. Site Survey</li> <li>g. Materials</li> <li>h. Materials Ordered and Received Storage of Materials Log strategy</li> </ul>	

3. Installing Supporting Structures
  - a. Set Up Telecom Closets
  - b. Installing Grounding Infrastructure
  - c. Installing Cable Support Systems
  
4. Pulling Cable Pulling Cable Setup
  - a. Pulling Horizontal Cable
  - b. Pulling Vertical Cable
  - c. Pulling Fiber Optic Cable
  - d. Restoring Fire Rating Penetrations
  
5. Terminating Cable
  - a. Pre-Terminating Functions
  - b. Copper IDC Termination
  - c. Coaxial Cable Termination
  - d. Fiber Termination
  
6. Splicing, Testing and Troubleshooting Cable
  - a. Copper Splicing, Testing, and Troubleshooting
  - b. Optical Fiber Splicing, Testing, and Troubleshooting
  
7. Retrofitting
  - a. Analysis of Current Infrastructure
  - b. Planning Retrofit Installation

**B. Computer Training Component**

**120 Hours**

(Based on Comp Tia A +)

1. Certification and Aries Technologies  
Computer Technician curriculum) - Hardware Training
  - a. Installation, Configuration and Upgrading
  - b. Diagnosing and Troubleshooting
  - c. Safety and Preventive Maintenance
  - d. Motherboard/Processors/Memory
  - e. Printers
  - f. Portable Systems
  - g. Basic Networking
  - h. Customer Satisfaction
  
2. Software Training (OS, DOS and Windows)
  - a. Function, Structure Operation and File Management
  - b. Memory Management
  - c. Installation, Configuration and Upgrading
  - d. Diagnosing and Troubleshooting
  - e. Networks OS's (Novell and Microsoft)
  - f. Administration of Network OS's

**C. LAN and WAN Introduction Internetworking Training Component      560 Hours**

1. Introduction to Internetworking
  - a. LAN Segmentation
  - b. TCP/IP
  - c. IP Addressing
  - d. Getting Started with Cisco Routers (May Have an Alternate Vendor Endorsement)
  
2. Routing Basics
  - a. Dynamic IP Routing
  - b. Router Configuration
  - c. Configuring Novell IPX
  
3. Managing Traffic with Access Lists
  - a. Wide Area Networking
  - b. Managing Traffic and Access
  - c. Managing Novell IPX/SPX Traffic
  - d. Configuring Queuing to Manage Traffic
  
4. Routing Protocols
  - a. Extending IP Addresses Using VLSM
  - b. Configuring OSPF in a Single Area
  - c. Interconnecting Multiple OSPF Areas
  - d. Configuring EIGRP
  
5. Optimizing Routing Update Operation
  - a. Connecting Enterprises to an Internet Service Provider
  - b. Configuring Dial-on Demand Routing
  - c. Customizing DDR Operations
  
6. Bridging
  - a. Configuring Transparent Bridging and Integrated Routing and Bridging
  - b. and Bridging
  - c. Configuring Source-Route Bridging
  - d. T1/E1 and ISDN PRI Options

**TOTAL HOURS****720**