Contest Description
Edmonton Expo Centre, Edmonton
May 7 & 8, 2025

EVENT: IT and Network Support	**LEVEL:** Post-Secondary
START TIME: **May 7:** 8:00 am **May 8:** 8:00 am	**LOCATION:** Hall E, Edmonton EXPO Centre, Edmonton
DURATION: Two Days	
WORLDSKILLS TRADE #: 39	

Please Note: This document is subject to change as competition information is updated. Competitors are responsible for staying up to date with the most recent information. Check the footer for last updated date. Changes will be highlighted in yellow.

CONTEST INTRODUCTION

Competitors will demonstrate their knowledge and skills in PC maintenance, network setup, and support functions while reflecting real-world environments and expectations.

SKILLS AND KNOWLEDGE TO BE TESTED:

- **Scenario Design (Basic Architecture)**: Developing network and server topology to meet simple business and technical requirements, including:
    - Two-site network topology
    - Redundant server topology
    - Redundant Active Directory (AD) Forest design
    - Redundant Network design
- **Implementation**: Setting up network and server infrastructure based on design recommendations, ensuring proper documentation and compliance with technical specifications.
- **Service Implementation:** Deploying and hardening services such as file sharing, DHCP, DNS, Active Directory (AD), Group Policy Objects (GPOs), and network security elements to ensure secure and efficient system operation.
- **Troubleshooting**: Identifying, documenting, and resolving a variety of issues across Network, Windows, and Linux systems. Scenarios will include varying levels of complexity.

PROJECT DESCRIPTION

1. **Scenario Design (Basic Architecture) – 30%**
   In this phase, competitors will design a two-site topology business-ready network and server infrastructure to meet specified technical requirements. The goal is to demonstrate logical thinking and best practices in creating a robust environment.
   a. **Network Topology**
      Competitors must propose a logical network topology. This includes determining how routers, switches, and end devices (servers, desktops) interconnect as well as considering key areas like:
      i. Layer 2 and Layer 3 Service Placement (Gateway placement, STP Considerations)
      ii. Segmentation (ACLs, VLANs, Trunk vs Access Ports)
      iii. Redundancy (Port Aggregation (PAGP, LACP), FHRP Protocols (HSRP, VRRP))
      iv. Network Security (Best Practice Implementation, ACLs, Device Hardening, VPN (IPsec), Protocols)
      v. Routing Protocols (RIP, OSPF, EIGRP.)
   b. **Server Topology**
      Competitors must propose a logical server topology. This includes determining the roles each server will fulfill, how servers interact with each other, and overall placement within the network. Consider key areas like:
      i. **Windows Servers**
         1. Domain Controllers (Primary, Secondary, and Additional Servers)
         2. File and Print Servers
         3. Application Servers (e.g., Web, Database)
         4. Core Services (e.g., AD, Certificate Services, DNS, DHCP, NPS, DFS)
      ii. **Linux Servers**
         1. Core Services (e.g., DNS, DHCP, LDAP)
         2. Web Services (Apache, Nginx)
         3. Email or Collaboration Services (Postfix, etc.)
         4. AD Integration
      iii. **Server Roles & Responsibilities**
         1. Role separation for security and performance
         2. Backup and Restore points
      iv. **High Availability & Redundancy**
         1. Disaster recovery considerations
   c. **Active Directory (AD) Forest Design**
      Competitors must propose an Active Directory (AD) Forest design. This includes structuring the forest, domains, and organizational units (OUs) in a way that aligns with the competition's business scenario. Key considerations include:
      i. **Forest & Domain Structure**
         1. Single or multiple domains
         2. Naming conventions (e.g., contoso.local)

3. Trust relationships (if more than one domain)

    ii. Organizational Units (OUs)
1. Hierarchy design (e.g., by department, function)
2. Delegation of administration
3. Group Policy Objects (GPO) linkage

    iii. User & Group Management
1. Account provisioning (naming standards, password policies)
2. Role-based access control (RBAC)
3. Group-based privilege assignments

    iv. Additional Services Integration
1. DNS integration with AD
2. Certificate Services (if applicable)
3. Network Policy Services NPS (if applicable)
4. Replication considerations (sites and services, domain controller placement)

d. Security

Competitors must propose a security plan. This includes detailing both network-level and host-level defenses, as well as following best practices for system hardening. Competitors should consider:

    i. Host-Based Security
1. Windows Firewall, Linux iptables/ufw
2. Antivirus/Antimalware configuration (Limited to MS Defender)
3. Least-privilege user permissions and file/folder access controls

    ii. Network Security
1. Access Control Lists (ACLs) on routers/switches
2. Device hardening (SSH vs. Telnet, disabling unused services, etc.)
3. VPN or encryption protocols (IPsec, SSL/TLS) where applicable

    iii. Group Policy & Configuration Management
1. GPO enforcement of business requirements such as: password policies, software restrictions, software installation, and other desktop customizations.

    iv. Secure Protocols & Hardening Standards
1. Implementing secure versions of common services (HTTPS, SSH)
2. Following industry best practices (Microsoft and Cisco Best Practices)
3. Ensuring data-in-transit and data-at-rest encryption where relevant. (eg. SMB)

2. **Implementation (Network & Server Infrastructure) – 15%**

After finalizing the design, competitors will **build** the foundation of their design (network and infrastructure elements) using VMware Workstation VMs. (See supplied software section below for details). The emphasis is on **core connectivity** and **base installations**.

    a. Network Infrastructure
        i. **Switch Configuration**: VLAN creation, access/trunk ports, base device configuration
        ii. **Router Configuration**: IP addresses on interfaces, routing, and base device configuration

iii. **Addressing**: Implementing the IP addressing scheme.
iv. **Documenting** all relevant settings (server names, IP addresses, roles).

b. **Server Infrastructure**
  i. **Windows Server 2019** (Core & Desktop Experience) Installation
  ii. **Ubuntu Server LTS** Installation
  iii. **Basic OS Configuration** (network settings, hostname)
  iv. **Provisioning roles** as described in the design (e.g., installing AD DS role on Windows Server if designated as a domain controller)
  v. Documenting all relevant settings (server names, IP addresses, roles).

3. **Implementation of Services – 30%**
  In this section, competitors will configure essential infrastructure services and apply best-practice security measures. The exact services required may include:

  a. **Core Windows Services**
    i. **Active Directory Domain Services (ADDS):** Creating and managing user accounts, groups, OUs, group policies
    ii. **DNS & DHCP:** Ensuring name resolution and dynamic IP allocation throughout the network
    iii. **File & Print Services**: Implementing file shares, NTFS permissions, and share permissions
    iv. **Group Policy**
      1. Controlling security settings, software installation policies, and other system behaviors.
      2. Enforcing password policies and desktop environment configurations.
    v. **Certificate Services**
      1. Installing and configuring a Certificate Authority (CA).
      2. Generating and managing certificates for secure communication (e.g., HTTPS, IPsec).
    vi. **Network Policy Server (NPS)**
      1. Centralizing network authentication, authorization, and accounting (AAA).
      2. Implementing RADIUS policies for remote or wireless access, 802.1x authentication, and VLAN assignment.
    vii. **Windows Deployment Services (WDS)**
      1. Automating the deployment of Windows operating systems.
      2. Creating and managing boot and install images, and configuring PXE boot environments.

  b. **Linux-Based Services**
    i. **LDAP Integration** (if specified) or local user/group administration
    ii. **Package Management & Repositories** (e.g., apt on Ubuntu)
    iii. **Web Server (Apache or Nginx),** FTP/SFTP, or Email Routing (Postfix) as scenario demands
    iv. **File Sharing with Samba:**

1. Integrating Linux file services with Windows-based clients and Active Directory (if applicable).
2. Managing shared folders, permissions, and authentication for cross-platform access.

 v. Email (Postfix)
1. Setting up a mail transfer agent (MTA) for sending and receiving emails.
2. Configuring basic security (SSL/TLS) and user mailboxes, if required by the scenario.

 vi. Backup Solutions: Configuring backup utilities or scripts to periodically back up data

c. Security & Hardening

 i. Routing & VPN
1. Configure routing protocols and establish secure site-to-site or end-to-end tunnels with IPsec.
2. Encrypt traffic where necessary to safeguard data in transit.

 ii. RADIUS & 802.1x
1. Integrate AAA (Authentication, Authorization, and Accounting) via RADIUS (e.g., NPS) for network devices.
2. Implement 802.1x for port-based network access control.

 iii. Certificates
1. Enforce secure protocols (e.g., HTTPS, SMTPS, SSH) with certificates issued by an internal CA.
2. Manage certificate lifecycles, including issuance, renewal, and revocation.

 iv. General Service Hardening
1. Limit unnecessary services and implement firewalls (e.g., Windows Firewall, iptables, ufw).
2. Apply the principle of least privilege to policies and permissions across all systems.
3. Enable logs and alerts for critical events.

 v. Firewall & Access Controls
1. Configure Windows Firewall, Linux iptables/ufw, or Cisco ACLs to restrict traffic to only what is necessary.

 vi. Securing Services
1. Utilizing secure protocols and services. (Eg. SSH, HTTPS).

 vii. Permissions & Ownership
1. Validate that all services or shares adhere to least-privilege principles.

d. Automation & Maintenance

 i. Scheduling maintenance tasks (Eg. backups)
 ii. Scripting to automate business processes (Eg. AD Account creation)

4. **Troubleshooting – 25%**
   To replicate real-world conditions, the competition will include intentional misconfigurations or failures across networking, Windows, and Linux systems. Competitors must identify and correct these issues.
   a. Competitors must systematically troubleshoot, document their findings, and resolve each scenario
   b. When multiple solutions exist, best-practice or most direct fixes are preferred (e.g., re-enabling a specific firewall rule vs. creating a broad new one)

All competitors must always exhibit workplace safety procedures and conduct themselves professionally.

EQUIPMENT & MATERIALS
Equipment and Materials Competitors Must Supply:

Writing and documentation utilities.	Pencil or Pens

Equipment and Materials Supplied by Committee:

Computer Workstations	Computer Accessories (I.e. Mouse & Keyboard)

Supplied Software:

Latest Ubuntu Server & Desktop LTS	Windows Server 2019 or Server 2022
Windows 10	VMWare Workstation or Player
Putty	Packet Tracer
Cisco Images (IOS/IOS XE, etc.)	GNS3

JUDGING CRITERIA
- Competitor's ability to properly configure Windows, Linux, and networking systems in a virtual environment.
- Proper installation of operating system and application software.
- Demonstration of network connectivity and system administration.
- Competence in configuring the router, switch, and firewalls where required.
- Safely utilize trade tools and display of proper methodology.
- Neatness of work area and space management.
- Neat and proper documentation of PC inventory and configuration settings.
- Tie-Breaking Procedure:
  o Highest Scenario Design Score: If two or more competitors tie in total points, the higher Scenario Design section score determines the winner.
  o Highest Troubleshooting Score: If a tie still remains, the higher Troubleshooting section score determines the winner.

Evaluation Breakdown

- o Scenario Design – 30%
- o Network and Server Infrastructure Implementation - 15%
- o Service Implementation – 30%
- o Troubleshooting – 25%

CLOTHING REQUIREMENT

Appropriate casual work clothing must be worn to compete. All clothing must be neat and clean and free of rips and tears. Casual wear such as shorts will not be permitted.

SAFETY

The health, safety and welfare of all individuals involved with Skills Canada Alberta are of vital importance. Safety is a condition of participation with Skills Canada Alberta and shall not be sacrificed for the sake of expediency. At the discretion of the judges and technical committees, any competitor can be denied the right to participate should they not have the required proper safety equipment and/or act in an unsafe manner that can cause harm to themselves or others.

ADDITIONAL INFORMATION

Skills Canada Alberta Regional and Provincial Rules and Regulations

Regional and Provincial Rules and Regulations

Test Project change at the Competition

Where a Test Project has been circulated to competitors in advance, the PTC can change the project up to a maximum of 30% of the work content for the competition.

Lunch

Lunch for competitors will be provided by Skills Canada Alberta.

Parking & Venue Maps: http://edmontonexpocentre.com/attend/parking/

Parking is FREE for all attendees.

Opening Ceremonies / Competitor Registration

Opening Ceremonies for the PSCC will take place on Tuesday May 6, 2025, at 6:00 pm in Hall D of the Edmonton EXPO Centre. Admission is free, and everyone is welcome to attend. It is important to note that competitor registration will open immediately following the Opening Ceremonies.

Awards Ceremony

The Awards Ceremony will take place on Thursday May 8, 2025, at 6:30 pm in Hall D of the Edmonton EXPO Centre. Admission is free and everyone is welcome to attend. The Awards Ceremony will be shown live at http://skillsalberta.com/

Team Alberta Information

Team Alberta will be selected at the PSCC Awards Ceremony. Gold medalists will then be eligible to participate at the Skills Canada National Competition (SCNC) on May 28- May 31, 2025, in Regina, SK. It is recommended that competitors review the SCNC contest description to be familiar with the national contest description and project at https://www.skillscompetencescanada.com/en/calendars/category/skills-canada-national-competition/

During the PSCC Awards Ceremony on Thursday May 8, 2025, gold medalists will be given their Team Alberta information package and will confirm their participation in the SCNC. Students must be present at the Awards Ceremony to claim their position on Team Alberta. If the Gold medalist is not able to attend SCNC, the next top ranking individual will be asked to participate. If a student is not able to attend the Awards Ceremony a letter confirming the student's interest in Team Alberta participation must be emailed to javierad@skillsalberta.com prior to the start of competition on May 7, 2025.

Please prepare your students in advance to accept a position on Team Alberta and review how your school will support their participation.
Please see this link for additional Team Alberta information: https://skillsalberta.com/team-alberta/

Questions?
Please contact Mike Sury MikeS@SkillAlberta.com

Committee Members:

Gerald Chung (Chair)
Shan Kampen
Damien Miller
Peter Estephan
Mehrshad Sahebsara