

# *Standards and Assessment Guide*

## **IT Network Systems Administration**

# Introduction

Welcome to the Standards and Assessment Guide (SAG), a comprehensive resource designed to support excellence in assessment practices for all skills competitions hosted at the WorldSkills Competition. A key component of the SAG is the commitment to continuous improvement through ongoing review, ensuring that these guides consistently reflect the latest industry innovations and high standards of assessment in an open and transparent manner.

## Purpose

The primary purpose of this guide is to provide a structured framework for the consistent and fair assessment of each skill competition. It aims to ensure that all assessments are conducted with a high degree of accuracy, reliability, validity, and reflect global industry standards. By adhering to these guidelines, assessors can maintain the integrity of the competition and uphold the high standards associated with WorldSkills.

**Note:** this guide is not a replacement for the Marking Scheme and should only be used as a reference when required during the assessment process. Competitors are not allowed to have a copy of this SAG in the workshop in either digital or paper form.

## Scope

This document covers general assessment practices applicable to a diverse range of industry sectors including:

- Manufacturing and Engineering Technology
- Information and Communication Technology
- Construction and Building Technology
- Transportation and Logistics
- Social and Personal Services
- Creative Arts and Fashion

Each skill competition has its unique requirements and benchmarks, which are detailed within sections of this guide. The consistency of assessment across each skill is the overarching principle, ensuring a unified approach to evaluating Competitor performance to the highest standards.

# Key Components

The guide is structured into several key components, each addressing critical aspects of the assessment process:

## Assessment Principles and Objectives

- Emphasis on fairness, transparency, and objectivity in assessments.
- Alignment with global industry standards and best practices.

## Assessment Methods and Tools

- Description of various assessment methods in Measurement and Judgement.
- Guidance on the application of appropriate assessment tools and equipment (if applicable).

## Criteria and Benchmarks

- Examples of assessment criteria and aspects for each skill, outlining the expected competencies and performance standards.
- Benchmarks for different levels of proficiency i.e. Judgement award range 0, 1, 2, 3 or Yes/No criteria alongside clear measurable descriptors.

## Expert assessment requirements

- Completion of the Access Programme.
- Approved Curriculum Vitae (CV).
- Reaching **100%** Expert preparedness.
- Full participation of online and in-person Mandatory Assessment Training (MAT).
- Completion of practical assessment testing at the Competition.

## Quality Assurance and Improvement

- Monitoring and evaluation: Ensuring assessments are carried out correctly and produce reliable results.
- Continuous improvement: Using feedback from Experts and Skill Competition Managers to enhance future assessments.
- Periodic review: Regularly updating processes to reflect current industry and WorldSkills standards.

## Implementation

For effective implementation, this guide should be used for guidance purposes only and in parallel with the Technical Description for each skill. Experts are encouraged to familiarize themselves thoroughly with both the general guidelines and the particular requirements of their respective skill areas. Collaborative efforts between the Skill Management Team, Experts, and Competitors are vital for achieving the ultimate goal of global skills development.

## Conclusion

The Standards and Assessment Guide embodies the commitment of the WorldSkills movement to nurturing talent and promoting the highest standards of vocational education and training worldwide. By providing clear and comprehensive guidance, we aim to empower Experts to conduct marking and assessment practices that are not only rigorous and equitable but also inspiring and transformative for all participants.

Thank you for your dedication to upholding these standards and contributing to the success of the WorldSkills Competition. Together, we can continue to champion skills excellence and celebrate the achievements of talented individuals from around the globe.

# Skill 39 – IT Network Systems Administration

## Assessment Procedures

### Competitors Virtual Environment

The Competitor is responsible for ensuring that their virtual environment is functional and available to Experts to undertake assessment. This includes:

- Ensuring all configuration files are saved and all relevant settings in any open configuration window are applied.
- Ensuring all virtual machines and network devices are powered on and in a running state.
- Adhering to all documented password requirements, deviation from the provided passwords may result in Experts being unable to access some/all devices.

When undertaking assessment, the Competitor's work may not be altered in any way to facilitate marking. This includes:

- Saving configuration files or applying settings on any open configuration windows.
- Changing configuration settings.
- Powering on or rebooting a virtual machine or network device.

An exception to the above requirements exists if the Marking Scheme specifically defines a modification to the environment as a part of the assessment process. This includes:

- Deleting a record or file to test access control or data protection
- Rebooting or stopping a device to test failover or redundancy
- Running an automation script or re-running an ansible playbook

In exceptional circumstances the assessment team can gain the approval from the Skill Competition Manager (SCM) or Chief Expert (CE) for actions such as rebooting a hung workstation or closing an open dialogue window if it is preventing assessment from continuing.

## Assessment Methodology

As the core function of an IT Network Systems Administrator is to install, configure and maintain networking services for end users the preferred assessment methodology to be used where appropriate is functional testing.

Functional testing provides the Competitors with the flexibility to implement the solution in different and creative ways while still achieving the desired end goal and provides a higher level of assurance that the solution is working as intended by testing it from the perspective of the end user.

Relying on configuration alone does not guarantee that the solution is functional, while the web server may be configured as expected it may not be functional as a web server if supporting services such as the networking or firewall are not configured correctly.

Some examples of functional testing:

| Task                        | Functional Tests                                                                                                                                                                                          |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configure an email server   | <ul style="list-style-type: none"> <li>• Send an email from user1 to user2</li> <li>• Confirm the email is received in the inbox user2</li> </ul>                                                         |
| Configure a VPN tunnel      | <ul style="list-style-type: none"> <li>• Ping from the remote network to a server in HQ</li> <li>• Traceroute from the remote network to a server in HQ</li> </ul>                                        |
| Configure folder access     | <ul style="list-style-type: none"> <li>• Attempt to create or read a file with a user who shouldn't have access</li> <li>• Attempt to create or read a file with a user who should have access</li> </ul> |
| Configure password policies | <ul style="list-style-type: none"> <li>• Attempt to change user1 password to "password" and ensure it fails</li> <li>• Attempt to change user1 password to "P@ssw0rd1." and ensure it succeeds</li> </ul> |

Non-functional testing can still be utilized as an assessment tool when it is appropriate such as:

- Checking a configuration file to see what routing protocol is used
- Checking a VPN configuration to see what encryption protocol is used for the tunnel

## Automated Marking

The use of a scripting language such as PowerShell or Bash should be used where possible to automate the assessment.

The use of automation provides a number of advantages:

- Speeds up the assessment process by removing the need to manually check functionality or configuration.
- Reduces errors by removing manual typing.
- Consistent and repeatable assessment for all Competitors.

When automated marking scripts are used:

- If the scripts are pre-installed within the Competitor's environment the script must be hashed and encrypted with a two-part password with one part of the password held by the Skill Competition Manager (SCM) and the other part held by the Independent Test Project Designer (ITPD).
- If the scripts are not pre-installed within the Competitor's environment and are provided to the assessment team at the conclusion of the project the Independent Test Project Designer (ITPD) is responsible for maintaining the integrity and security of the scripts.

The assessment team will be briefed by the Independent Test Project Designer (ITPD) on how to use the automated scripts.

Automated checks are not perfect and can fail for reasons such as the Competitor completing the task in a way not expected by the marking script or due to a typographical error. Where an aspect fails the automated check the assessment team should validate the results of the script by manually checking the aspect as outlined in the Marking Scheme.

## Destructive Aspects

Some assessment tasks may be destructive in nature and risk the stability or integrity of the Competitor's environment, these can include:

- Deleting data to test backup and recovery procedures.
- Forcing a system failure to test redundancy.
- Re-running a script to test automation tasks.

In order to not compromise the Competitor's work, any assessment tasks that can cause irrecoverable loss of data or functionality must be undertaken last after all other assessment is complete. Where possible a snapshot should be complete first to allow a roll back of Competitor's environment.

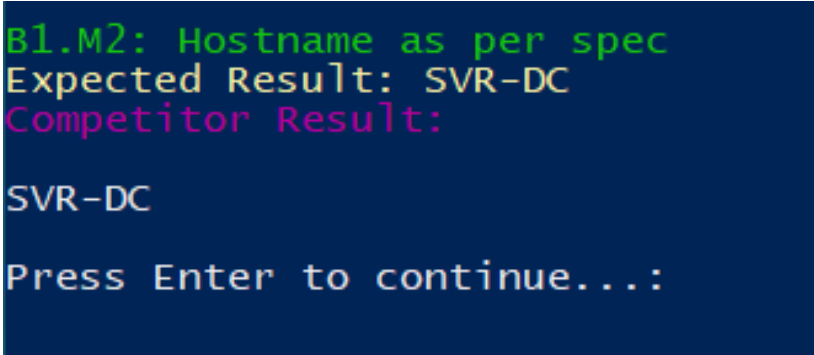
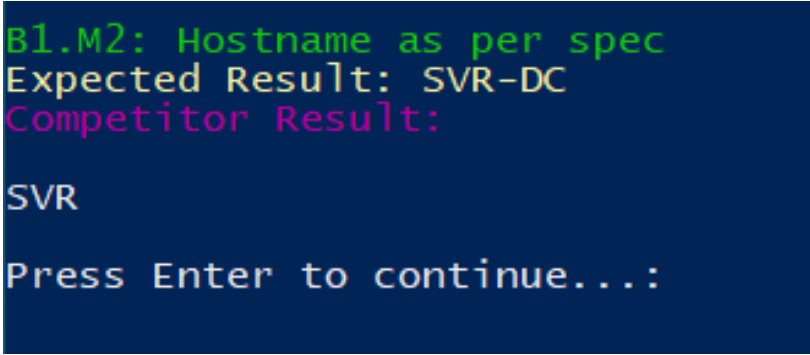
# Measurement

Measurement is used to assess accuracy, precision, and other performance that can be measured objectively. It is used where ambiguity must be avoided.

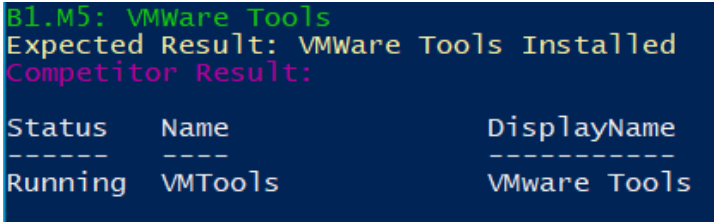
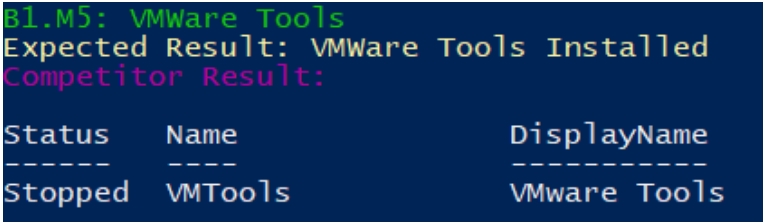
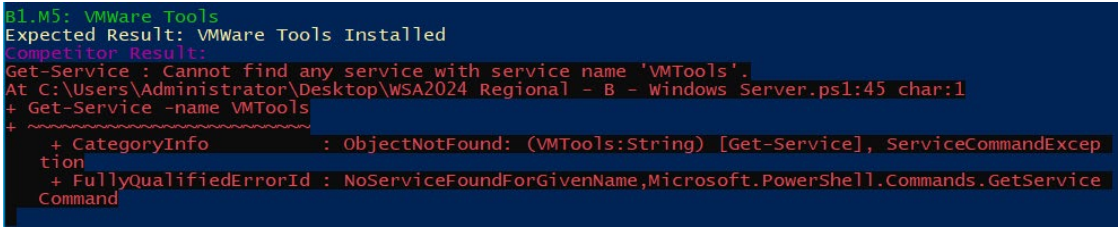
The total marks allocated to measurement marking may vary from Competition to Competition depending on the Test Project.

## Measurement Examples

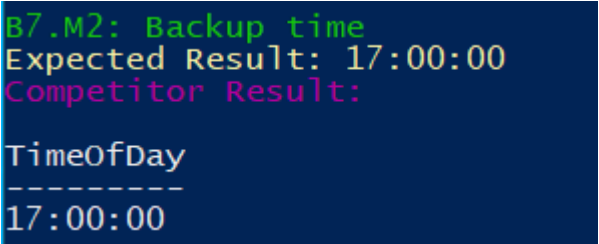
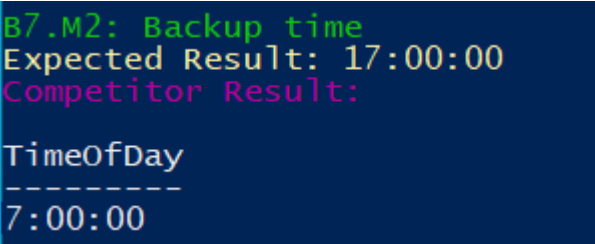
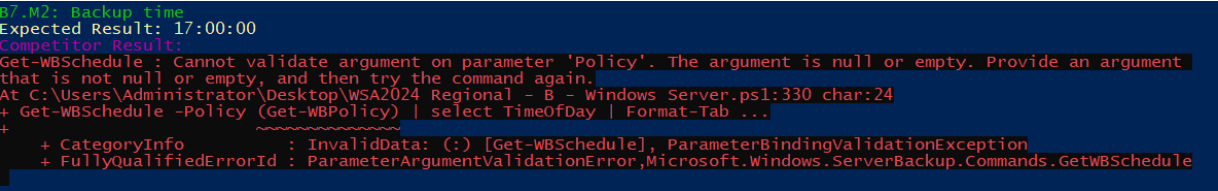
### Aspect – Hostname

| Aspect                                                                                                           | Sub Criterion             | Descriptor                                                                                                                              | Requirement |
|------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Measurement                                                                                                      | Hostname is set to SVR-DC | PowerShell -> hostname                                                                                                                  | SVR-DC      |
| <b>Correct Result:</b><br><br> |                           | <b>Incorrect Result: Incorrect hostname</b><br><br> |             |

## Aspect – VMware Tools Installed

| Aspect                                                                                                          | Sub Criterion                      | Descriptor                                                                                                                        | Requirement                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measurement                                                                                                     | VMWare Tools Installed and running | PowerShell -> Get-Service -name VMTools                                                                                           | <div> Status    Name                    DisplayName<br/> -----    ---                    -----<br/> Running   VMTools                VMware Tools </div> |
| <b>Correct Result:</b><br><br> |                                    | <b>Incorrect Result: Not Running</b><br><br>    |                                                                                                                                                          |
|                                                                                                                 |                                    | <b>Incorrect Result: Not Installed</b><br><br> |                                                                                                                                                          |

# Aspect – Backup Schedule

| Aspect                                                                                                          | Sub Criterion          | Descriptor                                                                                                                                                                                                                                                                                   | Requirement |
|-----------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Measurement                                                                                                     | System Backup Schedule | PowerShell -> Get-WBSchedule -Policy (Get-WBPolicy) select TimeOfDay                                                                                                                                                                                                                         | 17:00:00    |
| <b>Correct Result:</b><br><br> |                        | <b>Incorrect Result: Backup time is incorrect</b><br><br><br><br><b>Incorrect Result: Backup not configured</b><br><br> |             |

## Calculations

The Number Completed calculation is for aspects that measure the number of times an action is successfully completed. It awards a percentage of marks based on the number of items completed. For example, if a Competitor were required to successfully configure 5 IP addresses but only configured 4 they would receive 80% of the maximum mark for that aspect.

When marking calculated aspects, the Expert will only need to enter the number of correct elements for the aspect as output by the automated scripts and CIS will automatically allocate the correct percentage of the maximum mark

Calculations should be considered for assessment when the Competitor is required to complete repetitive and like tasks such as:

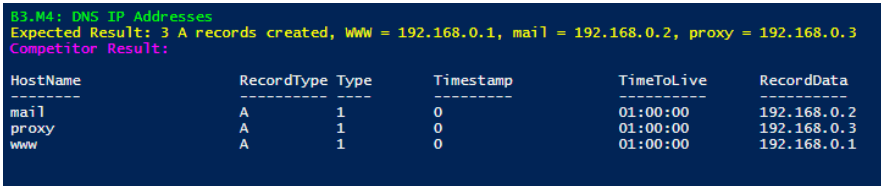
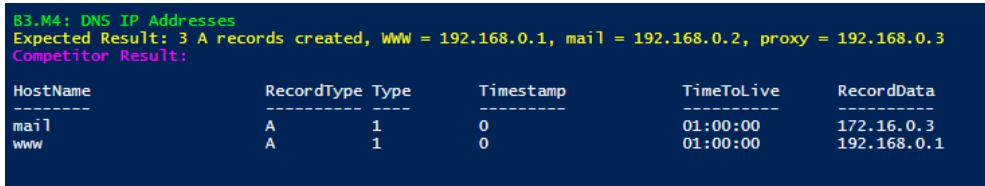
- IP addressing
- Creating users
- Configuring VLANs
- Configuring services to use insecure and secure protocols such as HTTP/HTTPS

## Calculation Examples

### Aspect – DNS 'A' Records

| Aspect                                                                                                                                                                                                                                                                    | Sub Criterion   | Descriptor                                                                                                                                                                                                                          | Requirement                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Calculated Measurement                                                                                                                                                                                                                                                    | DNS 'A' Records | Get-DnsServerResourceRecord -ZoneName "wsc2026.local" -RRType "A"                                                                                                                                                                   | Three (3) A records created: www, mail, proxy                                                               |
| <b>Correct Result (3/3) 100%:</b>                                                                                                                                                                                                                                         |                 | <b>Partially Correct Result (2/3) 66%: 1 Entry Missing</b>                                                                                                                                                                          | <b>Incorrect Result (0/3) 0%: Not configured</b>                                                            |
| <pre> B3.M4: DNS A records Expected Result: 3 A records created, www, mail, proxy Competitor Result:  HostName      RecordType  RecordData ----- mail          A           192.168.0.2 proxy         A           192.168.0.3 www           A           192.168.0.1 </pre> |                 | <pre> B3.M4: DNS A records Expected Result: 3 A records created, www, mail, proxy Competitor Result:  HostName      RecordType  RecordData ----- mail          A           192.168.0.2 www           A           192.168.0.1 </pre> | <pre> B3.M4: DNS A records Expected Result: 3 A records created, www, mail, proxy Competitor Result: </pre> |

## Aspect – DNS 'A' Records with correct IP address

| Aspect                                                                                                                      | Sub Criterion                           | Descriptor                                                                                                                                                               | Requirement                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Calculated Measurement                                                                                                      | DNS 'A' Records with correct IP address | Get-DnsServerResourceRecord -ZoneName "wsc2026.local" -RRType "A"                                                                                                        | Three (3) A records created:<br><br>www = 192.168.0.1<br>mail = 192.168.0.2<br>proxy = 192.168.0.3 |
| <b>Correct Result (3/3) 100%:</b><br><br> |                                         | <b>Partially Correct Result (1/3) 33%: 1 Entry missing, mail has wrong IP</b><br><br> |                                                                                                    |

## Aspect – IP Address Configuration

| Aspect                                                                                                                                  | Sub Criterion    | Descriptor                                                                                                                                                                                    | Requirement                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Calculated Measurement                                                                                                                  | IP Configuration | PowerShell ->Get-NetIPAddress -InterfaceAlias *Ethernet* -AddressFamily IPv4                                                                                                                  | IPAddress -eq "10.10.0.5"<br>PrefixLength -eq "16"                                                                                                                                                    |
|                                                                                                                                         |                  | Powershell -> Get-NetRoute -DestinationPrefix "0.0.0.0/0"                                                                                                                                     | NextHop -eq "10.10.0.8"                                                                                                                                                                               |
|                                                                                                                                         |                  | Powershell -> Get-DnsClientServerAddress -InterfaceAlias *Ethernet* - AddressFamily IPv4                                                                                                      | ServerAddresses -eq "127.0.0.1"<br>ServerAddresses -eq "192.168.50.5"                                                                                                                                 |
| Correct Result (5/5) 100%:                                                                                                              |                  | Partially Correct Result (3/5) 60%: 2 incorrect                                                                                                                                               | Incorrect Result (0/5) 0%: All incorrect                                                                                                                                                              |
| <pre>### Network Configuration IP Address CORRECT Mask CORRECT Gateway CORRECT Local DNS Server CORRECT Remote DNS Server CORRECT</pre> |                  | <pre>### Network Configuration (COUNT CORRECT ITEMS) IP Address CORRECT Mask CORRECT Gateway CORRECT Local DNS Server INCORRECT Remote DNS Server INCORRECT Press [Enter] to continue.:</pre> | <pre>### Network Configuration (COUNT CORRECT ITEMS) IP Address INCORRECT Mask INCORRECT Gateway INCORRECT Local DNS Server INCORRECT Remote DNS Server INCORRECT Press [Enter] to continue.:  </pre> |

## Aspect – User Account Creation

| Aspect                                                                                                                                                                                                       | Sub Criterion         | Descriptor                                                                                                                                                                       | Requirement                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Calculated Measurement                                                                                                                                                                                       | User accounts created | PowerShell -> get-ADUser -SearchBase "OU=Staff,DC=wsc2026,DC=local" -Filter *   Select SamAccountName                                                                            | Eight (8) user accounts created:<br><br>Medlandz, macintosh ,goodmand, warkl, vincentm, smithc, gunsona, edgeb            |
| <b>Correct Result (8/8) 100%:</b>                                                                                                                                                                            |                       | <b>Partially Correct Result (4/8) 50%: 4 missing</b>                                                                                                                             | <b>Incorrect Result (0/5) 0%: No users</b>                                                                                |
| <pre> B3.M3: Users in Staff OU Expected Result: Staff OU contains 8 user accounts Competitor Result:  SamAccountName ----- medlandz macintosh Goodmand warkl vincentm smithc gunsona edgeb  Count : 8 </pre> |                       | <pre> B3.M3: Users in Staff OU Expected Result: Staff OU contains 8 user accounts Competitor Result:  SamAccountName ----- medlandz Goodmand warkl vincentm  Count ---- 4 </pre> | <pre> B3.M3: Users in Staff OU Expected Result: Staff OU contains 8 user accounts Competitor Result:  Count ---- 0 </pre> |

# Aspect – VLAN creation

| Aspect                                                                                                                                                                                                                                                         | Sub Criterion | Descriptor                                                                                                                                                                                                                                                                          | Requirement                                                                                                                                                                                                                             |                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Calculated Measurement                                                                                                                                                                                                                                         | VLANS created | show vlan brief   ex default                                                                                                                                                                                                                                                        | <p>Four VLANs created with correct names</p> <p>(count each VLAN and each correct name):</p> <p>VLAN 10 CLIENT</p> <p>VLAN 99 Native</p> <p>VLAN 100 SERVER</p> <p>VLAN 999 UnusedPorts</p>                                             |                                                                                                    |
| <b>Correct Result (8/8) 100%:</b><br>VLAN Name                      Status<br>-----<br>10 CLIENT                      active<br>99 Native                      active<br>100 SERVER                      active<br>999 UnusedPorts                      active |               | <b>Partially Correct Result (7/8) 87.5%: 1 incorrect name</b><br>VLAN Name                      Status<br>-----<br>10 CLIENT                      active<br>99 Native                      active<br>100 SERVER                      active<br>999 VOIP                      active | <b>Partially Correct Result (6/8) 75%: 1 VLAN missing</b><br>VLAN Name                      Status<br>-----<br>10 CLIENT                      active<br>99 Native                      active<br>100 SERVER                      active | <b>Incorrect Result (0/8) 0%: Not configured</b><br>VLAN Name                      Status<br>----- |

## Judgement

Judgement is used to assess the quality of performance about which there may be small differences of view when applying the external benchmarks.

The Resources column in the table below may include all kinds/formats of resources such as: a link to a YouTube video, a website link, an illustration, a photo, a reference to a book, and so on. It needs to be as detailed as possible to show the differentiation between 0, 1, 2, 3.

### Generic rules:

The assessment group comprises three Experts plus one Expert who acts as the supervisor. The supervising Expert will replace an Expert in the marking group to prevent compatriot marking.

The difference of the three Experts' scores may not exceed 1. If this is the situation the Experts must re-score until there is a maximum difference of 1. As long as the three Experts judge within 1, the result can be entered into the CIS.

The total marks allocated to judgement marking may vary from Competition to Competition depending on the Test Project.

## Judgment Examples

### Aspect – Setup an IPSec Tunnel between two Cisco routers.

| WSOS section as per TD | Score | Descriptor                                                                                                            | Resource |
|------------------------|-------|-----------------------------------------------------------------------------------------------------------------------|----------|
| Judgement              | 0     | IPSec tunnel is not functional or is not configured                                                                   |          |
|                        | 1     | IPSec tunnel is functional, using IKE v1 with pre-shared key authentication                                           |          |
|                        | 2     | IPSec tunnel is functional, using IKE v1 with certificate authentication or IKE v2 with pre-shared key authentication |          |
|                        | 3     | IPSec tunnel is functional, using IKE v2 with certificate authentication                                              |          |

### Aspect - User authentication to a Cisco router

| WSOS section as per TD | Score | Descriptor                                                                                                                                                                 | Resource |
|------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Judgement              | 0     | Authentication is not functional or is not configured                                                                                                                      |          |
|                        | 1     | Authentication to the router functional and is configured using AAA local Authentication                                                                                   |          |
|                        | 2     | Authentication to the router is functional and is configured using AAA centralized Authentication (TACACS+ or RADIUS).                                                     |          |
|                        | 3     | Authentication to the router is functional and is configured using AAA centralized Authentication (TACACS+ or RADIUS).<br><br>A backup authentication server is configured |          |

**Aspect - In a Windows Domain, user 'PeterLee' can manage the user accounts of the Finance Department.**

| WSOS section as per TD | Score | Descriptor                                                                                                                                                                                                                                                                                                                                                                                         | Resource |
|------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Judgement              | 0     | Not configured or not functional                                                                                                                                                                                                                                                                                                                                                                   |          |
|                        | 1     | <p>'PeterLee' is a member of the 'Domain Admins' global group</p> <p>Note: Too much access granted, user 'PeterLee' has full access to the entire domain</p>                                                                                                                                                                                                                                       |          |
|                        | 2     | <p>'PeterLee' is a member of the 'Account Operators' local group</p> <p>Note: Less access than being added to the Domain Admins group but will have access to modify all accounts</p>                                                                                                                                                                                                              |          |
|                        | 3     | <ol style="list-style-type: none"> <li>1. OU created ie. 'Finance Users'</li> <li>2. All user accounts of Finance department in 'Finance OU'</li> <li>3. Group Created ie. 'Finance User Admin'.</li> <li>4. 'PeterLee' a member of the 'Finance User Admin' group</li> <li>5. 'Finance Users' OU has 'account management privileges' delegated to the group named 'Finance User Admin'</li> </ol> |          |

### Aspect - In a Windows Domain, user 'PeterLee' can manage the user accounts of the Finance Department.

| WSOS section as per TD | Score | Descriptor                                                                                                                                                                                                                                                                                                                                       | Resource |
|------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Judgement              | 0     | Not configured or not functional                                                                                                                                                                                                                                                                                                                 |          |
|                        | 1     | <p>'PeterLee' is a member of the 'Domain Admins' global group</p> <p>Note: Too much access granted, user 'PeterLee' has full access to the entire domain</p>                                                                                                                                                                                     |          |
|                        | 2     | <p>'PeterLee' is a member of the 'Account Operators' local group</p> <p>Note: Less access then being added to the Domain Admins group but will have access to modify all accounts</p>                                                                                                                                                            |          |
|                        | 3     | <p>6. OU created ie. 'Finance Users'</p> <p>7. All user accounts of Finance department in 'Finance OU'</p> <p>8. Group Created ie. 'Finance User Admin'.</p> <p>9. 'PeterLee' a member of the 'Finance User Admin' group</p> <p>10. 'Finance Users' OU has 'account management privileges' delegated to the group named 'Finance User Admin'</p> |          |

## Aspect – Configure DNS services in the Windows domain.

| WSOS section as per TD | Score | Descriptor                                                                                                                                                                                                                                               | Resource |
|------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Judgement              | 0     | Not configured or not functional                                                                                                                                                                                                                         |          |
|                        | 1     | Primary DNS server installed on a single server                                                                                                                                                                                                          |          |
|                        | 2     | <ul style="list-style-type: none"> <li>• Primary forward lookup zone configured</li> <li>• Secondary forward lookup zone configured</li> <li>• Reverse lookup zone configured</li> </ul>                                                                 |          |
|                        | 3     | <ul style="list-style-type: none"> <li>• DNS role installed on two active directory domain controllers</li> <li>• Active directory integrated DNS configured on two domain controllers</li> <li>• Forward and reverse lookup zones configured</li> </ul> |          |

## Aspect – Install Apache webserver and configure to host a website

| WSOS section as per TD | Score | Descriptor                                                                                                                                                                          | Resource |
|------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Judgement              | 0     | Not configured or not functional                                                                                                                                                    |          |
|                        | 1     | <ul style="list-style-type: none"> <li>• Apache installed</li> <li>• Website loads</li> <li>• HTTP only, no HTTPS</li> </ul>                                                        |          |
|                        | 2     | <ul style="list-style-type: none"> <li>• Apache installed</li> <li>• Website loads</li> <li>• HTTP and HTTPS configured, both are functional</li> </ul>                             |          |
|                        | 3     | <ul style="list-style-type: none"> <li>• Apache installed</li> <li>• Website loads</li> <li>• HTTPS only, no HTTP</li> <li>• Auto redirect configured from HTTP to HTTPS</li> </ul> |          |

## Aspect – Configuration a static route on a CSR1000v router using automation.

| WSOS section as per TD | Score | Descriptor                                                                                                                                                                                                                                                                                                                                                                   | Resource |
|------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Judgement              | 0     | Not configured or not functional                                                                                                                                                                                                                                                                                                                                             |          |
|                        | 1     | <ul style="list-style-type: none"> <li>Static route configured on router</li> <li>No automation used, SSH direct to router</li> </ul>                                                                                                                                                                                                                                        |          |
|                        | 2     | <ul style="list-style-type: none"> <li>Static route configured on router</li> <li>Ansible module: 'ios_command' used to automate task.</li> </ul> <p>ios_command:</p> <p>commands:</p> <p>- ip route 172.16.18.0 255.255.255.0 192.168.56.102</p> <p>Note: ios_command will work but there is a dedicated module</p>                                                         |          |
|                        | 3     | <ul style="list-style-type: none"> <li>Static route configured on router</li> <li>Ansible module: 'ios_static_route' used to automate task.</li> </ul> <p><i>ios_static_route:</i></p> <p><i>prefix: 172.16.18.0</i></p> <p><i>mask: 255.255.255.0</i></p> <p><i>next_hop: 192.168.56.102</i></p> <p>Note: 'ios_static_route' specifically for configuring static routes</p> |          |

## Aspect – Helpdesk Ticket

| WSOS section as per TD | Score | Descriptor                                                                                                                                                                                                                          | Resource |
|------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Judgement              | 0     | No or incorrect solution provided with unclear documentation                                                                                                                                                                        |          |
|                        | 1     | Non-optimal solution (band-aid solution, granting admin rights) provided with unclear documentation and troubleshooting steps<br><br>OR<br><br>No or incorrect solution provided with clear documentation showing logic and process |          |
|                        | 2     | Optimal solution provided with unclear documentation and troubleshooting steps<br><br>OR<br><br>Non-optimal solution (band-aid solution, granting admin rights) provided with clear documentation showing logic and process         |          |
|                        | 3     | Optimal solution provided (no band-aid fixes) with clear documentation showing logic and process.<br><br>The fault and its cause are well defined and the solution is well documented                                               |          |