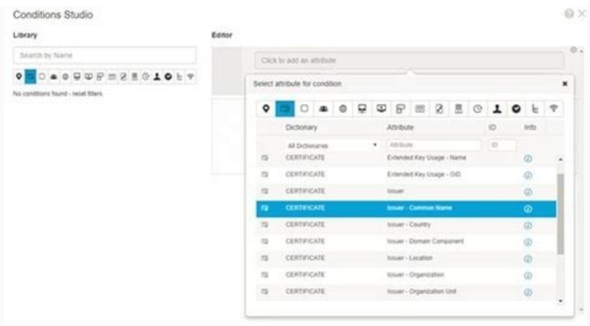
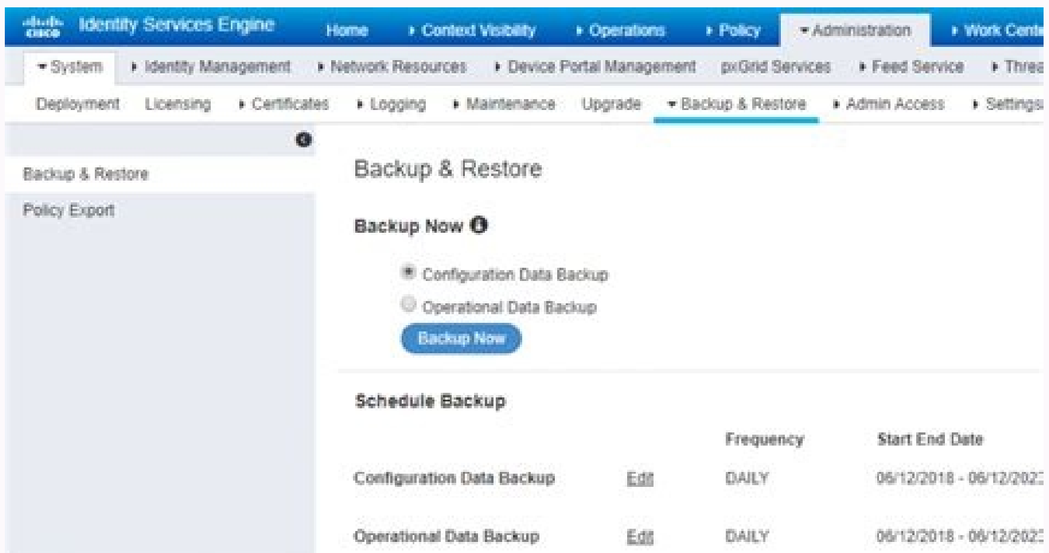
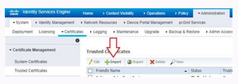
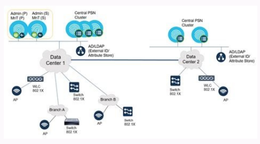
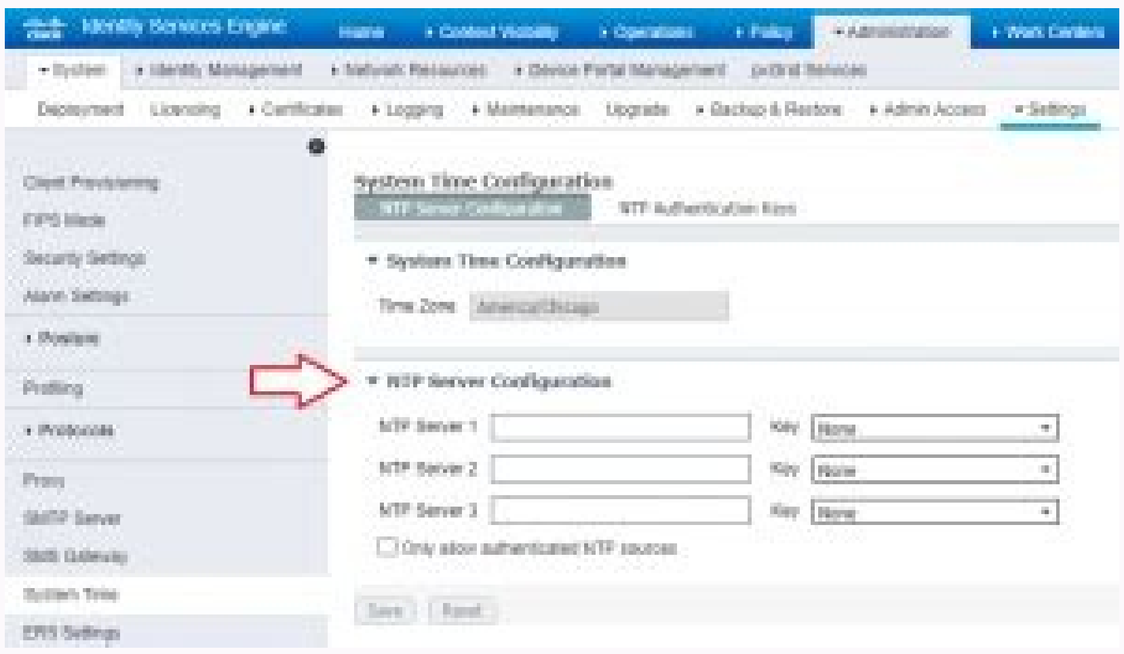
Cisco ise 2. 4 administration guide











Dictionaries are domain-specific catalogs of attributes and allowed values that can be used to define access policies for a domain. An individual dictionary is a homogeneous collection of attribute type. Attributes that are defined in a dictionary have the same attribute type and the type indicates the source or context of a given attribute. Attribute types can be one of the following: MSG_ATTR ENTITY_ATTR PIP_ATTR In addition to attributes and allowed values, a dictionary contains information about the attributes such as the name and description, data type, and the default values. An attribute can have one of the following data types: BOOLEAN, FLOAT, INTEGER, IPv4, IPv6, OCTET_STRING, STRING, UNIT32, and UNIT64. Cisco ISE creates system dictionaries during installation and allows you to create user dictionaries. Attributes are stored in different system dictionaries. Attributes are used to configure conditions. Attributes can be reused in multiple conditions. To reuse a valid attribute when creating policy conditions, select it from a dictionary that contains the supported attributes. For example, Cisco ISE provides an attribute named AuthenticationIdentityStore, which is located in the NetworkAccess dictionary. This attribute identifies the last identity source that was accessed during the authentication of a user: When a single identity source is used during authentication, this attribute includes the name of the identity store in which the authentication succeeded. When an identity source sequence is used during authentication, this attribute includes the name of the last identity source accessed. You can use the AuthenticationStatus attribute in combination with the AuthenticationIdentityStore attribute to define a condition that identifies the identity source to which a user has successfully been authenticated. For example, to check for a condition where a user authenticated using an LDAP directory (LDAP13) in the authorization policy, you can define the following reusable condition: If NetworkAccess.AuthenticationStatus EQUALS AuthenticationPassed AND NetworkAccess.AuthenticationIdentityStore EQUALS LDAP13 Note The AuthenticationIdentityStore represents a text field that allows you to enter data for the condition. Ensure that you enter or copy the name correctly into this field. If the name of the identity source changes, you must ensure to modify this condition to match the change to the identity source. To define conditions that are based on an endpoint identity group that has been previously authenticated, Cisco ISE supports authorization that was defined during endpoint identity group 802.1X authentication status. When Cisco ISE performs 802.1X authentication, it extracts the MAC address from the “Calling-Station-ID” field in the RADIUS request and uses this value to look up and populate the session cache for the device's endpoint identity group (defined as an endpointIDgroup attribute). This process makes the endpointIDgroup attribute available for use in creating authorization policy conditions, and allows you to define an authorization policy based on endpoint identity group information using this attribute, in addition to user information. The condition for the endpoint identity group can be defined in the ID Groups column of the authorization policy configuration page. Conditions that are based on user-related information need to be defined in the “Other Conditions” section of the authorization policy. If user information is based on internal user attributes, then use the ID Group attribute in the internal user dictionary. For example, you can enter the full value path in the identity group using a value like “User Identity Group:Employee:US”. Cisco ISE supports the following system-stored dictionaries that contain the different attributes necessary when building conditions and rules for your authentication and authorization policies: System-defined dictionaries CERTIFICATE DEVICE RADIUS RADIUS vendor dictionaries Airespace Cisco Cisco-BBSM Cisco-VPN3000 Microsoft Network access For authorization policy types, the verification configured in the condition must comply with the authorization profiles to be returned. Verifications typically include one or more conditions that include a user-defined name that can then be added to a library and reused by other policies. The following sections describe the supported attributes and dictionaries available for configuring conditions. The table lists the fixed attributes that are supported by dictionaries, which can be used in policy conditions. Not all of these attributes are available for creating all types of conditions. For example, while creating a condition to choose the access service in authentication policies, you will only see the following network access attributes: Device IP Address, ISE Host Name, Network Device Name, Protocol, and Use Case. You can use the attributes listed in the following table in policy conditions. Dictionary Attributes Allowed Protocol Rules and Proxy Identity Rules Device Device Type (predefined network device group) Yes Yes Device Location (predefined network device group) Other Custom Network Device Group Software Version Model Name RADIUS All attributes Yes Yes Network Access ISE Host Name Yes Yes AuthenticationMethod No Yes AuthenticationStatus No No CTSDeviceID No No Device IP Address Yes Yes EapAuthentication (the EAP method that is used during authentication of a user of a machine) No Yes EapTunnel (the EAP method that is used for tunnel establishment) No Yes Protocol Yes Yes UseCase Yes Yes UserName No Yes WasMachineAuthenticated No No Certificate Common Name No Yes Country E-mail LocationSubject Organization Organization Unit Serial Number State or Province Subject Subject Alternative Name Subject Alternative Name - DNS Subject Alternative Name - E-mail Subject Alternative Name - Other Name Subject Serial Number Issuer Issuer - Common Name Issuer - Organization Issuer - Organization Unit Issuer - Location Issuer - Country Issuer - Email Issuer - Serial Number Issuer - State or Province Issuer - Street Address Issuer - Domain Component Issuer - User ID Page 2 Cisco ISE licensing model allows you to purchase licenses based on your enterprise's needs. When using Traditional Licensing, you import all individual licenses and continue to manage them individually from ISE. When using Smart Licensing, you manage a centralized Cisco account, which contains all information about the different endpoint licenses you have purchased. Valid license options include: ISE Base only ISE Base and Plus ISE Base and Apex ISE Base and Device Administration ISE Base, Plus, Apex, and Device Administration ISE Base, Plus, Apex and AnyConnect Apex Device Administration Licenses There are two types of device administration licenses: cluster and node. A cluster license allows you to use device administration on all policy service nodes in a Cisco ISE cluster. A node license allows you to use device administration on a single policy service node. In a high-availability standalone deployment, a node license permits you to use device administration on a single node in the high availability pair. The device administration license key is registered against the primary and secondary policy administration nodes. All policy service nodes in the cluster consume device administration licenses, as required, until the license count is reached. Cluster licenses were introduced with the release of device administration in Cisco ISE 2.0, and is enforced in Cisco ISE 2.0 and later releases. Node licenses were released later, and are only partially enforced in releases 2.0 to 2.3. Starting with Cisco ISE 2.4, node licenses are completely enforced on a per-node basis. Cluster licenses have been discontinued, and now only node Licenses are available for sale. However, if you are upgrading to this release with a valid cluster license, you can continue to use your existing license upon upgrade. The number of Plus license sessions can be up to the number of Base license sessions on the deployment. The same stands for Apex license sessions. Apex and Plus licenses can be installed independently without any restriction on the number of Apex versus Plus licenses. Cisco ISE licenses are based on the number of concurrent endpoints with active network connections whereas AnyConnect Apex licenses are on a per user basis. AnyConnect Apex license count can exceed Cisco ISE Base license count. Note The services contained within the Plus license, most notably profiling, are frequently used across the entire deployment. When you add Plus licenses to the deployment, we recommend that the Plus license count be equal to the Base license count. However, you might have a situation where the Plus license services might not be needed across the entire deployment, which is why Cisco ISE allows the Plus license count to be less than the Base license count. Cisco recommends installing (for Traditional Licensing), or purchasing (for Smart Licensing) Base, Plus, and Apex licenses at the same time. Base licenses are required to use the services enabled by Plus and/or Apex licenses. However, you do not need a Plus license in order to have an Apex license or vice versa, since there is no overlap in their functionality. If the Plus and Apex licenses are not compliant, you cannot configure or edit Plus and Apex features. These features are displayed in read-only mode. When you install a Base or Mobility Upgrade license, Cisco ISE continues to use the default Evaluation license as a separate license for the remainder of its duration. When you install a Mobility Upgrade license, Cisco ISE enables all Wired, Wireless, and VPN services. A Base or Mobility license is required to install the Device Administration license. You cannot upgrade the Evaluation license to a Plus license without first installing the Base license. Licenses for VM nodes Cisco ISE is also sold as a virtual appliance. For Release 2.4, it is recommended that you install appropriate VM licenses for the VM nodes in your deployment. You must install the VM licenses based on the number of VM nodes and each VM node's resources such as CPU and memory. Otherwise, you will receive warnings and notifications to procure and install the VM license keys in Release 2.4, however, the services are not interrupted. VM licenses are offered under three categories, Small, Medium, and Large. For instance, if you are using 3595 equivalent VM node with 16 CPUs and 64 GB RAM, you need a Medium category VM license, if you want to replicate the same capabilities on the VM. If you only have VM Small licenses, but your VM node has the resources mapped to a VM Medium license, Cisco ISE will register the consumption of a VM Medium license. You will receive notifications of out-of-compliance license consumption. You must procure and install the appropriate license to stop receiving these notifications. You can install multiple VM licenses based on the number of VMs and their resources as per your deployment requirements. VM licenses are Infrastructure licenses, therefore, you can install VM licenses irrespective of the endpoint licenses available in your deployment. You can install a VM license even if you have not installed any Evaluation, Base, Plus, or Apex license in your deployment. However, in order to use the features enabled by the Base, Plus, or Apex licenses, you must install the appropriate licenses. After installing or upgrading to Release 2.4, if there is any mismatch between the number of deployed VM nodes and installed VM licenses, alarms are displayed in the Alarms dashlet for every 14 days. Alarms are also displayed if there are any changes in the VM node’s resources or whenever a VM node is registered or deregistered. VM licenses are perpetual licenses. VM licensing changes are displayed every time you log in to the Cisco ISE GUI, until you check the "Do not show this message again" check box in the notification popup. If you have not purchased a Cisco ISE VM license before, refer to the ISE Ordering Guide to choose the appropriate VM license. If you have Cisco ISE VM licenses with no associated Product Authorization Keys (PAK), contact the Cisco licensing team with the Sales Order numbers of your Cisco ISE VM purchases. Your request will be processed to provide one medium VM license key for each ISE VM purchase made. For assistance with licensing issues of lower severity levels, open a case online through the Support Case Manager, at . For Cisco TAC assistance with critical issues, refer to the contact information provided at . The following table shows the minimum VM resources by category: VM Category RAM Range Number of CPUs Small 16 GB 12 CPUs Medium 64GB 16 CPUs Large 256GB 16 CPUs Table 2. Cisco ISE License Packages ISE License Packages Perpetual/Subscription (Terms Available) ISE Functionality Covered Notes Base Perpetual Basic network access (AAA, IEEE-802.1X) Guest services Link encryption (MACSec) TrustSec ISE Application Programming Interfaces Passive identity services available as part of the upgrade from ISE-PIC to a Base license include limited pxGrid features available to Cisco subscribers only. Plus Subscription (1, 3, or 5 years) Bring Your Own Device (BYOD)—when consuming either a built-in or an external certificate authority MSE integration for location services Profiling and Feed Services Adaptive Network Control (ANC) Cisco pxGrid Does not include Base services; a Base license is required to install the Plus license. When onboarding an endpoint with the BYOD flow, the Plus services are consumed on the active session even when related BYOD attributes are not in use. Plus licenses are supposed to be consumed when profiling-related authorization policies contain IdentityGroup:Name. Apex Subscription (1, 3, or 5 years) Third Party Mobile Device Management (MDM) integration Posture Compliance TC NAC Does not include Base services; a Base license is required to install the Apex license. Note When you use Cisco AnyConnect as unified posture agent across wired, wireless, and VPN deployments, you need Cisco AnyConnect Apex user licenses in addition to Cisco ISE Apex licenses. Mobility Subscription (1, 3, or 5 years) Combination of Base, Plus, and Apex for wireless and VPN endpoints Cannot coexist on a Cisco Administration node with Base, Plus, and/or Apex licenses. Mobility Upgrade Subscription (1, 3, or 5 years) Provides wired support to Mobility license You can only install a Mobility Upgrade license on top of an existing Mobility license. Device Administration Perpetual TACACS+ A Base or Mobility license is required to install the Device Administration license. The number of Device Administration licenses must be equal to the number of Policy Service Nodes with TACACS+ persona enabled on them. ISE-PIC Perpetual Passive identity services One license per node. Each license supports up to 3,000 parallel sessions. ISE-PIC upgrade Perpetual This license allows these options: Enable additional (up to 300,000) parallel sessions. Upgrade to full ISE instance One license per node. Each license supports up to 300,000 parallel sessions. After installing this license, the upgraded node can join an existing ISE deployment or alternatively, base licenses can be installed on the node to function as the PAN. Passive identity services available as part of the upgrade to a Base license include limited pxGrid features available to Cisco subscribers only. Evaluation Temporary (90 days) Full Cisco ISE functionality is provided for 100 endpoints. All Cisco ISE appliances are supplied with an Evaluation license. Page 3 The documentation set for this product strives to use bias-free language. For the purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. Exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on RFP documentation, or language that is used by a referenced third-party product. Learn more about how Cisco is using Inclusive Language. Page 4 In this scenario, the network access device (NAD) makes a new authorization request to the Cisco ISE RADIUS server from an unknown endpoint connection. The endpoint then receives a url-redirect to Cisco ISE. Note webauth-vrf-aware command is supported only in IOS XE 3.7E, IOS 15.2(4)E or later versions. Other switches do not support WebAuth URL redirect in virtual routing and forwarding (VRF) environment. In such cases, as a workaround, you can add a route in the global routing table to leak the traffic back into the VRF. If the guest device is connected to a NAD, the guest service interaction takes the form of a MAC Authentication Bypass (MAB) request that leads to a Guest portal Central WebAuth login. The following is an outline of the subsequent Central Web Authentication (Central WebAuth) process, which applies to both wireless and wired network access devices. The guest device connects to the NAD through a hard-wired connection. There is no 802.1X supplicant on the guest device. An authentication policy with a service type for MAB allows a MAB failure to continue and return a restricted network profile containing a url-redirect for the Central WebAuth user interface. The NAD is configured to authenticate MAB requests to the Cisco ISE RADIUS server. The Cisco ISE RADIUS server processes the MAB request and does not find an endpoint for the guest device. This MAB failure resolves to the restricted network profile and returns the url-redirect value in the profile to the NAD in an access-accept. To support this function, ensure that an authorization policy exists and features the appropriate wired or wireless MAB (under compound conditions) and, optionally, “Session:Posture Status=Unknown” conditions. The NAD uses this value to redirect all guest HTTPS traffic on the default port 8443 to the url-redirect value. The standard URL value in this case is: :port/guestportal/gateway?sessionId=NetworkSessionId&portal=&action=cwa The guest device initiates an HTTP request to redirect URL via a web browser. The NAD redirects the request to the url-redirect value returned from the initial access-accept. The gateway URL value with action CWA redirects to the Guest portal login page. The guest enters their login credentials and submits the login form. The guest server authenticates the login credentials. Depending on the type of flow, the following occurs: If it is a non-posture flow (authentication without further validation), where the Guest portal is not configured to perform client provisioning, the guest server sends a CoA to the NAD. This CoA causes the NAD to reauthenticate the guest device using the Cisco ISE RADIUS server. A new access-accept is returned to the NAD with the configured network access. If client provisioning is not configured and the VLAN needs to be changed, the Guest portal performs VLAN IP renew. The guest does not have to re-enter login credentials. The username and password entered for the initial login are used automatically. If it is a posture flow, where the Guest portal is configured to perform client provisioning, the guest device web browser displays the Client Provisioning page for posture agent installation and compliance. (You can also optionally configure the client provisioning resource policy to feature a “NetworkAccess:UseCase=GuestFlow” condition.) The Guest portal redirects to the Client Provisioning portal (because there is no client provisioning or posture agent for Linux), which in turn redirects back to a guest authentication servlet to perform optional IP release/renew and then CoA. With redirection to the Client Provisioning portal, the Client Provisioning service downloads a non-persistent web agent to the guest device and performs a posture check of the device. You can optionally configure the posture policy with a “NetworkAccess:UseCase=GuestFlow” condition. If the guest device is non-compliant, ensure that you have configured an authorization policy that features “NetworkAccess:UseCase=GuestFlow” and “Session:Posture Status=NonCompliant” conditions. When the guest device is compliant, ensure that you have an authorization policy configured with the conditions “NetworkAccess:UseCase=GuestFlow” and “Session:Posture Status=Compliant.” From here, the Client Provisioning service issues a CoA to the NAD. This CoA causes the NAD to reauthenticate the guest using the Cisco ISE RADIUS server. A new access-accept is returned to the NAD with the configured network access. Note “NetworkAccess:UseCase=GuestFlow” can also apply for Active Directory and LDAP users who log in as guests. Page 5 You can customize a report and save the changes as a new report, or restore the default report settings in My Reports at the top right corner of the report summary page. You can also customize and schedule Cisco ISE reports to run and re-run at specific time or time intervals. You can also send and receive email notifications for the reports generated. When scheduling reports with Hourly frequency, you can have the report run over multiple days, but the timeframe cannot spread across two days. For example, when scheduling an hourly report from May 4, 2019, to May 8, 2019, you can set the time interval as between 6:00 a.m. and 11:00 p.m. each day, but not between 6:00 p.m. of one day and 11:00 a.m. of the next. Cisco ISE displays an error message that the time range is invalid in the latter case. Note If an external administrator (for example: Active Directory Administrator) creates a scheduled report without filling the email-id field, no email notifications will be sent. You cannot schedule the following reports: Authentication Summary Health Summary RBACL Drop Summary Guest Sponsor summary Endpoint Profile Changes Network Device Session Status Note You can save or schedule (customize) Cisco ISE reports only from the PAN. Note iI Primary MnT is down, the Secondary MnT executes the scheduled report job. The scheduled report job runs on both Primary MnT and Secondary MnT. On Secondary MnT, before running the export job, it tries to ping the Primary MnT. In case if the ping fails, then only it runs the export job otherwise the export job gets skipped. When you go back to a saved report, all the filter options are checked by default. Uncheck the filters that you do not wish to use. You can also remove a saved report from My Reports category. Page 6 The Cisco ISE dashboard or home page () is the landing page that you view after you log in to the Cisco ISE administration portal. The dashboard is a centralized management console consisting of metric meters along the top of the window, with dashlets below. The default dashboards are Summary, Endpoints, Guests, Vulnerability, and Threat. See Cisco ISE Home Dashboards. Note You can view this dashboard data only in the Cisco ISE primary PAN portal. The dashboard’s real-time data provides an at-a-glance status of the devices and users accessing your network, and an overview of the system's health. Click the gear icon in the second level menu bar for a drop-down list of dashboard settings. The following table contains descriptions for the dashboard settings options available in the drop-down list: Drop-Down List Option Description Add New Dashboard You can have a maximum of 20 dashboards, including the five default dashboards. Rename Dashboard (This option is available only for custom dashboards) To rename a dashboard: Click Rename Dashboard. Specify a new name. Click Apply. Add Dashlet To add a dashlet to the home page dashboard: Click Add Dashlet(s). In the Add Dashlets window, click Add next to the dashlets that you want to add. Click Save. Note You can add a maximum of nine dashlets per dashboard. Export You can export the dashboard data as a PDF or a CSV file. Click Export. In the Export dialog box, click the radio button next to one of the following file formats: PDF: Choose the PDF format for a snapshot view of the selected dashlets. CSV: Choose the CSV format to download the selected dashboard data as a zip file. In the Export dialog box, check the check boxes next to the dashlets you want to export. Click Export. The zip file contains individual dashlet CSV files for the selected dashboard. Data related to each tab in a dashlet is displayed as separate sections in the corresponding dashlet CSV file. When you export a custom dashboard, the zip file is exported with the same name. For example, if you export a custom dashboard that is named MyDashboard, then the exported file's name is MyDashboard.zip. Layout Template You can change the layout of the template in which the dashlets are displayed. To change the layout: Click Layout Template. Select the required layout from the options available. Manage Dashboards Click Manage Dashboards and choose one of the following options: Mark as Default Dashboard: Use this option to set a dashboard as your default dashboard (the home page). Reset all Dashboards: Use this option to reset all the dashboards to their original settings. You can delete a dashboard that you have created by clicking the close (x) icon next to the corresponding custom dashboard. Note You cannot rename or delete a default dashboard. Each dashlet has a toolbar at the top-right corner where you can perform the following operations: Detach: To view a dashlet in a separate window. Refresh: To refresh a dashlet. Remove: To remove a dashlet from the dashboard. You can drag and drop the dashlet using the gripper icon that is present at the top-left corner of the dashlet. The Alarms dashlet contains a quick filter for the Severity column. You can filter alarms by their severity by choosing Critical, Warning, or Info from the Severity drop-down list. Page 7 Administrators can use the admin portal to: Manage deployments, help desk operations, network devices, and node monitoring and troubleshooting. Manage Cisco ISE services, policies, administrator accounts, and system configuration and operations. Change administrator and user passwords. A CLI administrator can start and stop the Cisco ISE application, apply software patches and upgrades, reload or shut down the Cisco ISE appliance, and view all the system and application logs. Because of the special privileges that are granted to a CLI administrator, we recommend that you protect the CLI administrator credentials and create web-based administrators for configuring and managing Cisco ISE deployments. The username and password that you configure during setup is intended only for administrative access to the CLI. This role is considered to be the CLI admin user, also known as CLI administrator. By default, the username for a CLI admin user is admin, and the password is defined during setup. There is no default password. This CLI admin user is the default admin user, and this user account cannot be deleted. However, other administrators can edit it, including options to enable, disable, or change password for the corresponding account. You can either create an administrator, or you can promote an existing user to an administrator role. Administrators can also be demoted to simple network user status by disabling the corresponding administrative privileges. Administrators are users who have local privileges to configure and operate the Cisco ISE system. Administrators are assigned to one or more admin groups. Note Starting with Cisco ISE Release 2.7, use alphanumeric values while creating user accounts in Cisco ISE. A CLI administrator can start and stop the Cisco ISE application, apply software patches and upgrades, reload or shut down the Cisco ISE appliance, and view all the system and application logs. Because of the special privileges granted to a CLI administrator, we recommend that you protect the CLI administrator credentials and create web-based administrators for configuring and managing Cisco ISE deployments. Cisco ISE administrators can perform various administrative tasks based on the administrative group to which they belong. These administrative tasks are critical. Grant administrative access only to users who are authorized to administer Cisco ISE in your network. Cisco ISE allows you to control administrative access to its web interface through the options described here. . Note When a Cisco ISE server is added to a network, it is marked to be in Running state after its web interface comes up. However, it might take some more time for all the services to be fully operational because some advanced services such as posture services might take longer to be available. You can connect to the Cisco ISE servers in several ways. The Policy Administration node (PAN) runs the Administrators portal. An admin password is required to log in. Other ISE persona servers are accessible through SSH or the console, where you run the CLI. This section describes the process and password options available for each connection type. Admin password: The Cisco ISE Admin user that you created during installation times out in 45 days by default. You can prevent that by turning off the password lifetime from . Click the Password Policy tab, and uncheck theAdministrative passwords expire check box under Password Lifetime. If you do not do this, and the password expires, you can reset the admin password in the CLI by running the application reset-passwd command. You can reset the Admin password by connecting to the console to access the CLI, or by rebooting the ISE image file to access the boot options menu. CLI password: You must enter a CLI password during installation. If you have a problem logging in to the CLI because of an invalid password, you can reset the CLI password. Connect to the console and run the password CLI command to rest the password. See the Cisco Identity Services Engine CLI Reference Guide for more information. SSH access to the CLI: You can enable SSH access either during installation or after, using the service sshd command. You can also force SSH connections to use a key. Note that when you do this, SSH connections to all the network devices also use that key. For more information, see the SSH Key Validation section in Cisco ISE Admin Guide: Segmentation. You can force the SSH key to use the Diffie-Hellman algorithm. Note that ECDSA keys are not supported for SSH keys. Cisco ISE provides role-based access control (RBAC) policies that ensure security by restricting administrative privileges. RBAC policies are associated with default admin groups to define roles and permissions. A standard set of permissions (for menu as well as data access) is paired with each of the predefined admin groups, and is thereby aligned with the associated role and job function. Some features in the user interface require certain permissions for their use. If a feature is unavailable, or you are not allowed to perform a specific task, your admin group may not have the necessary permissions to perform the task that utilizes the feature. Regardless of the level of access, any administrator account can modify or delete objects for which it has permission, on any window that it can access. Note Only system-defined admin users with Super Admin or Read Only Admin permissions can see the identity-based users who are not a part of a user group. Admins you create without these permissions cannot see these users. Cisco ISE allows you to configure permissions at the menu and data levels. These are called menu access and data access permissions. The menu access permissions allow you to show or hide the menu and submenu items of the Cisco ISE administrative interface. This feature lets you create permissions so that you can restrict or enable access at the menu level. The data access permissions allow you to grant read and write, read only, or no access to the Admin Groups, User Identity Groups, Endpoint Identity Groups, Locations, and Device Types data in the Cisco ISE interface. RBAC policies determine if an administrator can be granted a specific type of access to a menu item or other identity group data elements. You can grant or deny access to a menu item or identity group data element to an administrator based on the admin group, by using RBAC policies. When administrators log in to the Admin portal, they can access menus and data that are based on the policies and permissions defined for the admin groups with which they are associated. RBAC policies map admin groups to menu access and data access permissions. For example, you can prevent a network administrator from viewing the Admin Access operations menu and the policy data elements. This can be achieved by creating a custom RBAC policy for the admin group with which that network administrator is associated. Note If you are using customized RBAC policies for admin access, ensure that you provide all the relevant menu access for a given data access. For example, to add or delete endpoints with data access of Identity or Policy Admin, you must provide menu access to Work Center > Network Access and Administration > Identity Management. Cisco ISE provides an out-of-the-box set of permissions that are associated with a set of predefined admin groups. Having predefined admin group permissions allow you to set permissions so that a member of any admin group can have full or limited access to the menu items within the administrative interface (known as menu access) and to delegate an admin group to use the data access elements of other admin groups (known as data access). These permissions are reusable entities that can be further used to formulate RBAC policies for various admin groups. Cisco ISE provides a set of system-defined menu access permissions that are already used in the default RBAC policies. Apart from the predefined menu access permissions, Cisco ISE also allows you to create custom menu access permissions that you can use in RBAC policies. The key icon represents menu access privileges for the menus and submenus, and the key with a close icon represents no access for different RBAC groups. Note For a Super Admin user, all the menu items are available. For other admin users, all the menu items in the Menu Access Privileges column are available for standalone deployment and primary node in a distributed deployment. For secondary nodes in a distributed deployment, the menu items under the Administration tab are not available. Cisco ISE allows you to create custom menu access permissions that you can map to an RBAC policy. Depending on the role of the administrators, you can allow them to access only specific menu options. Step 1 Choose . Step 2 Click Add, and enter values for the Name and Description fields. Step 3 Click Submit. When an RBAC admin has Full Access permission to an object (for example, Employee in the User Identity Groups data type), the admin can view, add, update, and delete users who belong to that group. Ensure that the admin has menu access permission granted for the Users window (Administration > Identity Management > Identities > Users). This is applicable for network devices and endpoints objects (based on the permissions granted to the Network Device Groups and Endpoint Identity Groups data types). You cannot enable or restrict data access for network devices that belong to the default network device group objects—All Device Types and All Locations. All the network devices are displayed if Full Access data permission is granted to an object created under these default network device group objects. Therefore,we recommend that you create a separate hierarchy for the Network Device Groups data type, which is independent of the default network device group objects. You should assign the network device objects to the newly created Network Devices Groups to create restricted access. Note You can enable or restrict data access permissions only for the User Identity Groups, Network Device Groups, and Endpoint Identity Groups, not to Admin Groups. Cisco ISE comes with a set of predefined data access permissions. These permissions enable multiple administrators to have the data access permissions within the same user population. You can enable or restrict the use of data access permissions to one or more admin groups. This process allows autonomous delegated control to administrators of one admin group to reuse data access permissions of the chosen admin groups through selective association. Data access permissions range from full access to no access for viewing selected admin groups or network device groups. RBAC policies are defined based on the administrator (RBAC) group, menu access, and data access permissions. You should first create menu access and data access permissions and then

create an RBAC policy that associates an admin group with the corresponding menu access and data access permissions. The RBAC policy takes the form: If admin_group=Super Admin then assign SuperAdmin Menu Access permission + SuperAdmin Data Access permission. Apart from the predefined data access permissions, Cisco ISE also allows you to create custom data access permissions that you can associate with an RBAC policy. There are three data access permissions, namely, Full Access, No Access, and Read Only access that can be granted to admin groups. The Read Only permission can be granted to the following admin groups: Administration > Admin Access > Administrators > Admin Groups Administration > Groups > User Identity Group Administration > Groups > Endpoint Identity Groups Network Visibility > Endpoints Administration > Network Resources > Network Device Groups Administration > Network Resources > Network Devices Administration > Identity Management > Identities Administration > Identity Management > Groups > User Identity Groups Administration > Identity Management > Groups > Endpoint Identity Groups If you have read-Only permission for a data type (for example, Endpoint Identity Groups), you will not be able to perform CRUD operations on that data type. If you have read-only permission for an object (for example, GuestEndpoints), you cannot perform edit or delete operations on that object. The following image describes how Data Access Privileges apply at the second-level or third-level menu that contains additional submenus or options for different RBAC groups. Figure 1. Data Access Privileges Label Description 1 Denotes full access for the User Identity groups data type. 2 Denotes that Endpoint Identity groups derive the maximum permission (full access) that is granted to its child (Asia). 3 Denotes that there is no access for the object (blocked list). 4 Denotes that the parent (Continents) derives the maximum access permission granted to its child (Asia). 5 Denotes Read-Only access for the object (Australia). 6 Denotes that when full access is granted to the parent (Network Device groups), it results in the children automatically inheriting permissions. 7 Denotes that when full access is granted to the parent (Asia), it results in the objects inheriting the Full Access permission, unless permissions are explicitly granted to the objects. Cisco ISE allows you to create custom data access permissions that you can map to an RBAC policy. Based on the role of the administrator, you can choose to provide them access only to select data. Step 1 Choose . Step 2 Choose. Step 3 Click Add, and enter values for the Name and Description fields. Step 4 Click Save. The default Read-Only Admin policy is available in the Administration > System > Admin Access > Authorization > Policy window. This policy is available for both new installations and upgraded deployments. The Read-Only Admin policy is applicable to the Read-Only Admin group. By default, Super Admin Menu Access and Read-Only Data Access permissions are granted to Read-Only administrators. This policy cannot be duplicated and the associated Data Access permission cannot be edited. Note The default read-only policy is mapped to the Read Only Admin group. You cannot create custom RBAC policy using the Read Only Admin group. Cisco ISE supports the read-only functionality based on the static check of Read-Only Admin Group only. Page 8 Cisco ISE Overview Cisco ISE Features Note The documentation set for this product strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. Exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on RFP documentation, or language that is used by a referenced third-party product. Cisco Identity Services Engine (ISE) is an identity-based network access control and policy enforcement system. It functions as a common policy engine that enables endpoint access control and network device administration for enterprises. You can leverage Cisco ISE to ensure compliance, enhance infrastructure security, and streamline service operations. A Cisco ISE administrator can gather real-time contextual data for a network, including users and user groups (who?), device type (what?), access time (when?), access location (where?), access type (wired, wireless, or VPN) (how?), and network threats and vulnerabilities. As a Cisco ISE administrator, you can use this information to make network governance decisions. You can also tie identity data to various network elements to create policies that govern network access and usage. The Cisco ISE software must be installed as is. You cannot install any other third-party applications at the underlying Operating System level. Cisco ISE empowers you with the following capabilities: Device Administration: Cisco ISE uses the TACACS+ security protocol to control and audit the configuration of network devices. It facilitates granular control of who can access which network device and change the associated network settings. Network devices can be configured to query Cisco ISE for authentication and authorization of device administrator actions. These devices also send accounting messages to Cisco ISE to log such actions. Guest and Secure Wireless: Cisco ISE enables you to provide secure network access to visitors, contractors, consultants, and customers. You can use web-based and mobile portals to on-board guests to your company’s network and internal resources. You can define access privileges for different types of guests, and assign sponsors to create and manage guest accounts. Bring Your Own Device (BYOD): Cisco ISE allows your employees and guests to securely use their personal devices on your enterprise network. BYOD feature end users can use configured pathways to add their devices, and provision predefined authentications and levels of network access. Asset Visibility: Cisco ISE gives you visibility and control over who and what is on your network consistently, across wireless, wired, and VPN connections. Cisco ISE uses probes and device sensors to listen to the way devices connect to the network. The Cisco ISE profile database, which is extensive, then classifies the device. This gives the visibility and context you need to grant the right level of network access. Secure Access: Cisco ISE uses a wide range of authentication protocols to provide network devices and endpoints with a secure network access. These include, but are not limited to, 802.1X, RADIUS, MAB, web-based, EasyConnect, and external agent-enabled authentication methods. Segmentation: Cisco ISE uses contextual data about network devices and endpoints to facilitate network segmentation. Security group tags, access control lists, network access protocols, and policy sets that define authorization, access, and authentication, are some ways in which Cisco ISE enables secure network segmentation. Posture or Compliance: Cisco ISE allows you to check for compliance, also known as posture, of endpoints, before allowing them to connect to your network. You can ensure that endpoints receive the appropriate posture agents for posturing services. Threat Containment: If Cisco ISE detects threat or vulnerability attributes from an endpoint, adaptive network control policies are sent to dynamically change its access levels of the endpoint. After the threat or vulnerability is evaluated and addressed, the endpoint is given back its original access policy. Security Ecosystem Integrations: The pxGrid feature allows Cisco ISE to securely share context-sensitive information, policy and configuration data, and so on, with connected network devices, third-party vendors, or Cisco partner systems. Page 9 A posture condition can be any one of the following simple conditions: a file, a registry, an application, a service, or a dictionary condition. One or more conditions from these simple conditions form a compound condition, which can be associated with a posture requirement. After an initial posture update, Cisco ISE also creates Cisco-defined simple and compound conditions. Cisco-defined simple conditions use the pc_ as and compound conditions use pr_ as. A user-defined condition or a Cisco-defined condition includes both simple and compound conditions. Posture service makes use of internal checks based on antivirus and antispyware (AV/AS) compound conditions. Hence, posture reports do not reflect the exact AV/AS compound-condition names that you have created. The reports display only the internal check names of AV/AS compound conditions. For example, if you have created an AV compound condition named "MyCondition_AV_Check" to check any Vendor and any Product, the posture reports will display the internal check, that is “av_def_ANY”, as the condition name, instead of "MyCondition_AV_Check". Page 10 You can use Cisco pxGrid to share the context-sensitive information from Cisco ISE session directory with other network systems such as Cisco ISE ecosystem partner systems and other Cisco platforms. The pxGrid framework can also be used to exchange policy and configuration data between nodes, such as sharing tags and policy objects between Cisco ISE and third-party vendors, and for other information exchanges. Cisco pxGrid also allows third-party systems to invoke adaptive network control actions (EPS) to quarantine users or devices or both in response to a network or security event. The Cisco TrustSec information like tag definition, value, and description can be passed from Cisco ISE through the Cisco TrustSec topic to other networks. The endpoint profiles with Fully Qualified Names (FQNs) can be passed from Cisco ISE to other networks through an endpoint profile meta topic. Cisco pxGrid also supports bulk download of tags and endpoint profiles. You can publish and subscribe to SXP bindings (IP-SGT mappings) through Cisco pxGrid. For more information about SXP bindings, see the "Security Group Tag Exchange Protocol" section in Cisco ISE Admin Guide: Segmentation . In a high-availability configuration, Cisco pxGrid servers replicate information between the nodes through the PAN. When the PAN goes down, the Cisco pxGrid server stops handling the client registration and subscription. You need to manually promote the PAN for the Cisco pxGrid server to become active. You can check the Cisco pxGrid services window (Administration > pxGrid Services) to verify whether a Cisco pxGrid node is currently in active or standby state. On the active Cisco node that has the pxGrid persona, these processes are displayed as Running. On the standby Cisco pxGrid node, they are displayed as Standby. If the active pxGrid node goes down, the standby pxGrid node detects this, and starts the four pxGrid processes. Within a few minutes, these processes show as Running, and the standby node becomes the active node. You can verify whether the Cisco pxGrid service is in standby on that node by running the CLI command show logging application pxgrid/pxgrid.state. For Extensible Messaging and Presence Protocol clients, Cisco pxGrid nodes work in active-standby high availability mode which means that the Cisco pxGrid Service is in Running state on the active node and in Disabled state on the standby node. Note In a High Availability Cisco ISE deployment, the pxGrid persona nodes that work in an active-standby setup show that the pxGrid Service is in running state on the active node and in standby state on the standby node. To verify the status of pxGrid services on a Cisco ISE node, use the following CLI command: show logging application pxgrid/pxgrid.state After the automatic failover to the secondary Cisco pxGrid node is initiated, if the original primary Cisco pxGrid node is brought back into the network, the original primary Cisco pxGrid node continues to have the secondary role and isnot promoted back to the primary role unless the current primary node goes down. Note At times, the original primary Cisco pxGrid node might be automatically promoted back to the primary role. In a high-availability deployment, when the primary Cisco pxGrid node goes down, it might take around three to five minutes to switchover to the secondary Cisco pxGrid node. We recommend that the client waits for the switchover to complete, before clearing the cache data just in case the primary Cisco pxGrid node fails. The following logs are available for the Cisco pxGrid node: pxgrid.log: State change notifications. pxgrid-cm.log: Updates on publisher or subscriber or both and data exchange activity between the client and the server. pxgrid-controller.log: Displays the details of client capabilities, groups, and client authorization. pxgrid-jabberd.log: Displays all the logs related to system state and authentication. pxgrid-pubsub.log: Displays all the information related to publisher and subscriber events. Note If Cisco pxGrid service is disabled on a node, port 5222 is down, but port 8910 (used by web clients) is functional and continues to respond to the requests. Note You can enable Cisco pxGrid with Base license, but you must have a Plus license to enable the Cisco pxGrid persona. In addition, certain extended Cisco pxGrid services may be available in your Base installation if you have recently installed an upgrade license for . Note Cisco pxGrid should be defined in order to work with the Passive ID Work Center. For more information, see the "PassiveID Work Center" section in Cisco ISE Admin Guide: Asset Visibility . Clients connecting to Cisco ISE must register and receive account approval before using Cisco pxGrid services. Cisco pxGrid clients use the Cisco pxGrid client library available in the Cisco pxGrid SDK to become the clients. Cisco ISE supports both auto and manual approvals. A client can log in to Cisco pxGrid using a unique name and certificate-based mutual authentication. Similar to the AAA setting on a switch, clients can connect to either a configured Cisco pxGrid server hostname or an IP address. Cisco pxGrid capabilities are information topics or channels on Cisco pxGrid for clients to publish and subscribe. In Cisco ISE, only capabilities such as Identity, Adaptive Network Control (ANC) , and Security Group Access (SGA) are supported. When a client creates a new capability, it appears in the View by Capabilities window. The navigation path for this window is . You can enable or disable capabilities individually. Capability information is available from the publisher through publish, directed query, or bulk download query. When a web client publisher uses REST APIs or WebSocket protocols, the topics added in the web client publisher are not immediately listed in the tab in Cisco ISE. Such a web client topic appears in the Web Clients tab only after its first instance of publishing. Note Users that are assigned to Endpoint Protection service (EPS) user group can perform actions in session group, because Cisco pxGrid session group is part of EPS group. If a user is assigned to EPS group, the user will be able to subscribe to the session group on the Cisco pxGrid client. The Live Logs window displays all the pxGrid management events. Event info includes the client and capability names along with the event type and timestamp. The navigation path for this window is . You can also clear the logs and resynchronize or refresh the list. Page 11 To restore configuration data through the Cisco ISE CLI, use the restore command in the EXEC mode. Use the following command to restore data from a configuration or operational backup: restore filename repository repository-name encryption-key hash|plain encryption-key name include-adeos Syntax Description restore Type this command to restore data from a configuration or operational backup. filename Name of the backed-up file that resides in the repository. Supports up to 120 alphanumeric characters. Note You must add the .tar.gpg extension after the filename (for example, myfile.tar.gpg). repository Specifies the repository that contains the backup. repository-name Name of the repository you want to restore the backup from. encryption-key (Optional) Specifies user-defined encryption key to restore backup. hash Hashed encryption key for restoring backup. Specifies an encrypted (hashed) encryption key that follows. Supports up to 40 characters. plain Plaintext encryption key for restoring backup. Specifies an unencrypted plaintext encryption key that follows. Supports up to 15 characters. encryption-key name Enter the encryption key. include-adeos (Optional, applicable only for configuration backup) Enter this command operator parameter if you want to restore ADE-OS configuration from a configuration backup. When you restore a configuration backup, if you do not include this parameter, Cisco ISE restores only the Cisco ISE application configuration data. No default behavior or values. EXEC When you use restore commands in Cisco ISE, the Cisco ISE server restarts automatically. The encryption key is optional while restoring data. To support restoring earlier backups where you have not provided encryption keys, you can use the restore command without the encryption key. ise/admin# restore mybackup-100818-1502.tar.gpg repository myrepository encryption-key plain Lab12345 Restore may require a restart of application services. Continue? (yes/no) [yes] ? yes Initiating restore. Please wait... ISE application restore is in progress. This process could take several minutes. Please wait... Stopping ISE Application Server... Stopping ISE Monitoring & Troubleshooting Log Processor... Stopping ISE Monitoring & Troubleshooting Log Collector... Stopping ISE Monitoring & Troubleshooting Alert Process... Stopping ISE Monitoring & Troubleshooting Session Database... Stopping ISE Database processes... Starting ISE Database processes... Starting ISE Monitoring & Troubleshooting Session Database... Starting ISE Application Server... Starting ISE Monitoring & Troubleshooting Alert Process... Starting ISE Monitoring & Troubleshooting Log Collector... Starting ISE Monitoring & Troubleshooting Log Processor... Note: ISE Processes are initializing. Use 'show application status ise' CLI to verify all processes are in running state. ise/admin# Description backup Performs a backup (Cisco ISE and Cisco ADE OS) and places the backup in a repository. backup-logs Backs up system logs. repository Enters the repository submode for configuration of backups. show repository Displays the available backup files located on a specific repository. show backup history Displays the backup history of the system. show backup status Displays the status of the backup operation. show restore status Displays the status of the restore operation. If the sync status and replication status after application restore for any secondary node is Out of Sync, you have to reimport the certificate of that secondary node to the Primary PAN and perform a manual synchronization. Page 12 Wireless Setup is disabled by default after fresh installation of Cisco ISE. You can enable Wireless Setup from the Cisco ISE CLI with the application configure ise command (select option 17) or by using the Wireless Setup option () available in the top right-hand corner in the Cisco ISE GUI home page. Wireless Setup does not work if you upgrade Cisco ISE from a previous version. Wireless Setup is supported only for new Cisco ISE installations. Wireless Setup works only on a standalone node. Run only one instance of Wireless Setup at a time. Only one person can run Wireless Setup at a time. Wireless Setup requires ports 9103 and 9104 to be open. To close these ports, use the CLI to disable Wireless Setup. If you would like to start a fresh installation of Wireless Setup after running some flows, you can use the CLI command application reset-config ise. This command resets the Cisco ISE configuration and clears the Cisco ISE database, but keeps the network definitions. So you can reset Cisco ISE and Wireless Setup, without having to reinstall Cisco ISE and running setup. If you would like to start over with Wireless Setup, you can reset both Cisoc ISE and Wireless Setup's configuration with the following steps: In the CLI, run application reset-config to reset all Cisco ISE configuration. If you were testing Wireless Setup on a fresh installation, this command removes the configurations done by Wireless Setup in Cisco ISE. In the CLI, run application configure ise, and choose [18]Reset Config Wi-Fi Setup. This cleans the Wireless Setup configuration database. On the Wireless Controller, remove the configurations added by Wireless Setup on the Wireless Controller. For information about what Wireless Setup configures on the Wireless Controller, see Changes on Cisco ISE and Wireless Controller by the Wireless Setup flow. You can avoid these steps by taking a snapshot of the VM after you finish a fresh installation of Cisco ISE. For more information about the CLI, see the Cisco Identity Services Engine CLI Reference Guide for your version of ISE. You must be a Cisco ISE Super Admin user to use Wireless Setup. Wireless Setup requires at least two CPU cores and 8 GB of memory. Only Active Directory (AD) groups and users are supported. After you have created one or more flows in Wireless Setup, other types of users, groups, and authorizations are available for Wireless Setup, but they must be configured on ISE. If you already defined Active Directory in Cisco ISE, and you plan to use this AD for Wireless Setup, then: The join name and domain name must be the same. If the names are not the same, then make them the same in Cisoc ISE before using that AD in Wireless Setup. If your Wireless Controller is already configured on Cisco ISE, the Wireless Controller must have a shared secret configured. If the Wireless Controller definition does not have the shared secret, then either add the shared secret, or delete the Wireless Controller from Cisco ISE, before configuring that Wireless Controller in Wireless Setup. Wireless Setup can configure Cisco ISE components, but it can't delete or modify them after a flow has been started. For a list of all the things that Wireless Setup configures in Cisco ISE, see Cisco Identity Services Engine CLI Reference Guide for your version of Cisco ISE. When you start a flow, you must complete the flow. Clicking a breadcrumb in the flow stops the flow. As you step through a flow, changes are made to the Cisco ISE configuration dynamically. Wireless Setup provides a list of configuration changes, so you can manually revert. You can't back up in a flow to make extra changes, with one exception. You can go back to change Guest or BYOD portal customization. Multiple Wireless Controllers and Active Directory domains are supported, but each flow can only support one Wireless Controller and one Active Directory. Wireless Setup requires a Cisco ISE Basic license to operate. BYOD requires a Cisco ISE Plus license. If you have configured Cisco ISE resources before configuring Wireless Setup, Wireless Setup may have conflicts with an existing policy. If this happens, Wireless Setup advises you to review the authorization policy after running through the tool. We recommended that you start with a clean setup of Ciisco ISE when running Wireless Setup. Support for a mixed configuration of Wireless Setup and Cisco ISE is limited. Wireless Setup is available in English, but not other languages. If you want to use other languages with your portal, configure that in Cisco ISE after running Wireless Setup. Dual SSID is supported for BYOD. The Open SSID used in this configuration does not support guest access, due to conflicts. If you need a portal that supports both guest and BYOD, you cannot use Wireless Setup, and is out of the scope of this document. Email and SMS Notifications For self-registered guests, SMS and email notification is supported. These notifications are configured in the portal customization notification section. You must configure an SMTP server to support SMS and email notifications. The cellular providers built in Cisco ISE, which include AT&T, T Mobile, Sprint, Orange and Verizon, are pre-configured, and are free to email to the SMS gateways. A guest chooses their cell provider in the portal. If their provider is not in the list, then they can't receive a message. You can also configure a global provider, but that is outside of the scope of this guide. If the guest portal is configured for SMS and email notification, then they must enter values for both those services. The Sponsored guest flow does not provide configuration for SMS or email notification in Wireless Setup. For that flow, you must configure notification services in Cisco ISE. Do not select the SMS provider Global Default when configuring notifications for a portal. This provider is not configured (by default). Wireless setup only supports a standalone setup without HA. If you decide to use extra PSNs for authentication, then add the Cisco ISE IP address of those PSNs to your Wireless Controller’s RADIUS configuration. Page 13 If you have experience with working with CSS files, you can customize the default portal theme CSS files to alter the portal presentation and manipulate elements such as the page layout, colors, and fonts. Customizing the CSS files provides you with flexibility and control in specifying the presentation characteristics, it enables you to share formatting across multiple pages, and it reduces the complexity and repetition in the structural content. Cisco ISE end-user portals use two distinct types of CSS files: structure.css and theme.css. Every portal theme has its own theme.css file, but there is only one structure.css file per portal type; for example guest.structure.css for Guest portals, sponsor.structure.css for Sponsor Portals, and mydevices.structure.css for My Devices portals. The structure.css provides the styling for the page layout and structure. It defines the positioning of elements on each page and also includes jQuery Mobile structure styles. You can only view the structure.css file, but you cannot edit it. However, when you change the page layout within theme.css files, import these files into the portal, and apply them, the most recent changes take priority over the structure.css styles. The theme.css files specify styles such as fonts, button colors, and header background. You can export the theme.css files, change the theme settings, and import them to use as custom themes for your portal. Any page layout style changes made to the theme.css files take priority over the styles that are defined in the structure.css file. You cannot alter any of the Cisco provided default portal theme.css files. However, you can edit the settings in the files and save them to a new custom theme.csstheme.css file. You can make further edits to the custom theme.css file, but when you import it back into Cisco ISE, remember to use the same theme name you originally used for it. You cannot use two different theme names for the same theme.css file. For example, you can use a default green theme.css file to create a new custom blue theme.css file and name it as Blue. You can then edit the blue theme.css file, but when you import it again, you must reuse the same Blue theme name. You cannot call it Red, since Cisco ISE checks for the relationship between a filename and its name and the uniqueness of the theme’s name. You can however edit the blue theme.css file, save it as red theme.css, import the new file, and name it as Red. Page 14 All TrustSec network devices possess a TrustSec PAC as part of the EAP-FAST protocol. This is also utilized by the secure RADIUS protocol where the RADIUS shared secret is derived from parameters carried by the PAC. One of these parameters, Initiator-ID, holds the TrustSec network device identity, namely the Device ID. If a device is identified using TrustSec PAC and there is no match between the Device ID, as configured for that device on Cisco ISE, and the Initiator-ID on the PAC, the authentication fails. Some TrustSec devices (for example, Cisco firewall ASA) do not support the EAP-FAST protocol. Therefore, Cisco ISE cannot provision these devices with TrustSec PAC over EAP-FAST. Instead, the TrustSec PAC is generated on Cisco ISE and manually copied to the device; hence this is called as the Out of Band (OOB) TrustSec PAC generation. When you generate a PAC from Cisco ISE, a PAC file encrypted with the Encryption Key is generated. This section describes the following: Page 15 You can use Cisco pxGrid to share the context-sensitive information from Cisco ISE session directory with other network systems such as Cisco ISE ecosystem partner systems and other Cisco platforms. The pxGrid framework can also be used to exchange policy and configuration data between nodes, such as sharing tags and policy objects between Cisco ISE and third-party vendors, and for other information exchanges. Cisco pxGrid also allows third-party systems to invoke adaptive network control actions (EPS) to quarantine users or devices or both in response to a network or security event. The Cisco TrustSec information like tag definition, value, and description can be passed from Cisco ISE through the Cisco TrustSec topic to other networks. The endpoint profiles with Fully Qualified Names (FQNs) can be passed from Cisco ISE to other networks through an endpoint profile meta topic. Cisco pxGrid also supports bulk download of tags and endpoint profiles. You can publish and subscribe to SXP bindings (IP-SGT mappings) through Cisco pxGrid. For more information about SXP bindings, see the "Security Group Tag Exchange Protocol" section in Cisco ISE Admin Guide: Segmentation . In a high-availability configuration, Cisco pxGrid servers replicate information between the nodes through the PAN. When the PAN goes down, the Cisco pxGrid server stops handling the client registration and subscription. You need to manually promote the PAN for the Cisco pxGrid server to become active. You can check the Cisco pxGrid services window (Administration > pxGrid Services) to verify whether a Cisco pxGrid node is currently in active or standby state. On the active Cisco node that has the pxGrid persona, these processes are displayed as Running. On the standby Cisco pxGrid node, they are displayed as Standby. If the active pxGrid node goes down, the standby pxGrid node detects this, and starts the four pxGrid processes. Within a few minutes, these processes show as Running, and the standby node becomes the active node. You can verify whether the Cisco pxGrid service is in standby on that node by running the CLI command show logging application pxgrid/pxgrid.state. For Extensible Messaging and Presence Protocol clients, Cisco pxGrid nodes work in active-standby high availability mode which means that the Cisco pxGrid Service is in Running state on the active node and in Disabled state on the standby node. Note In a High Availability Cisco ISE deployment, the pxGrid persona nodes that work in an active-standby setup show that the pxGrid Service is in running state on the active node and in standby state on the standby node. To verify the status of pxGrid services on a Cisco ISE node, use the following CLI command: show logging application pxgrid/pxgrid.state After the automatic failover to the secondary Cisco pxGrid node is initiated, if the original primary Cisco pxGrid node is brought back into the network, the original primary Cisco pxGrid node continues to have the secondary role and isnot promoted back to the primary role unless the current primary node goes down. Note At times, the original primary Cisco pxGrid node might be automatically promoted back to the primary role. In a high-availability deployment, when the primary Cisco pxGrid node goes down, it might take around three to five minutes to switchover to the secondary Cisco pxGrid node. We recommend that the client waits for the switchover to complete, before clearing the cache data just in case the primary Cisco pxGrid node fails. The following logs are available for the Cisco pxGrid node: pxgrid.log: State change notifications. pxgrid-cm.log: Updates on publisher or subscriber or both and data exchange activity between the client and the server. pxgrid-controller.log: Displays the details of client capabilities, groups, and client authorization. pxgrid-jabberd.log: Displays all the logs related to system state and authentication. pxgrid-pubsub.log: Displays all the information related to publisher and subscriber events. Note If Cisco pxGrid service is disabled on a node, port 5222 is down, but port 8910 (used by web clients) is functional and continues to respond to the requests. Note You can enable Cisco pxGrid with Base license, but you must have a Plus license to enable the Cisco pxGrid persona. In addition, certain extended Cisco pxGrid services may be available in your Base installation if you have recently installed an upgrade license for . Note Cisco pxGrid should be defined in order to work with the Passive ID Work Center. For more information, see the "PassiveID Work Center" section in Cisco ISE Admin Guide: Asset Visibility . Clients connecting to Cisco ISE must register and receive account approval before using Cisco pxGrid services. Cisco pxGrid clients use the Cisco pxGrid client library available in the Cisco pxGrid SDK to become the clients. Cisco ISE supports both auto and manual approvals. A client can log in to Cisco pxGrid using a unique name and certificate-based mutual authentication. Similar to the AAA setting on a switch, clients can connect to either a configured Cisco pxGrid server hostname or an IP address. Cisco pxGrid capabilities are information topics or channels on Cisco pxGrid for clients to publish and subscribe. In Cisco ISE, only capabilities such as Identity, Adaptive Network Control (ANC) , and Security Group Access (SGA) are supported. When a client creates a new capability, it appears in the View by Capabilities window. The navigation path for this window is . You can enable or disable capabilities individually. Capability information is available from the publisher through publish, directed query, or bulk download query. When a web client publisher uses REST APIs or WebSocket protocols, the topics added in the web client publisher are not immediately listed in the tab in Cisco ISE. Such a web client topic appears in the Web Clients tab only after its first instance of publishing. Note Users that are assigned to Endpoint Protection service (EPS) user group can perform actions in session group, because Cisco pxGrid session group is part of EPS group. If a user is assigned to EPS group, the user will be able to subscribe to the session group on the Cisco pxGrid client. The Live Logs window displays all the pxGrid management events. Event info includes the client and capability names along with the event type and timestamp. The navigation path for this window is . You can also clear the logs and resynchronize or refresh the list. Page 16 Cisco ISE retrieves user or machine attributes and groups from Active Directory for use in authorization policy rules. These attributes can be used in Cisco ISE policies and determine the authorization level for a user or machine. Cisco ISE retrieves user and machine Active Directory attributes after successful authentication and can also retrieve attributes for an authorization that is independent of authentication. Cisco ISE may use groups in external identity stores to assign permissions to users or computers; for example, to map users to sponsor groups. You should note the following restrictions on group memberships in Active Directory: Policy rule conditions may reference any of the following: a user’s or computer’s primary group, the groups of which a user or computer is a direct member, or indirect (nested) groups. Domain local groups outside a user’s or computer’s account domain are not supported. Note You can use the value of the Active Directory attribute, msRadiusFramedIPAddress, as an IP address. This IP address can be sent to a network access server (NAS) in an authorization profile. The msRADIUSFramedIPAddress attribute supports only IPv4 addresses. Upon user authentication, the msRadiusFramedIPAddress attribute value fetched for the user will be converted to IP address format. Attributes and groups are retrieved and managed per join point. They are used in authorization policy (by selecting first the join point and then the attribute). You cannot define attributes or groups per scope for authorization, but you can use scopes for authentication policy. When you use a scope in authentication policy, it is possible that a user is authenticated via one join point, but attributes and/or groups are retrieved via another join point that has a trust path to the user's account domain. You can use authentication domains to ensure that no two join points in one scope have any overlap in authentication domains. Note During the authorization process in a multi join point configuration, Cisco ISE will search for join points in the order in which they listed in the authorization policy, only until a particular user has been found. Once a user has been found the attributes and groups assigned to the user in the join point, will be used to evaluate the authorization policy. An authorization policy fails if the rule contains an Active Directory group name with special characters such as /, !, @, \, #, $, %, ^, &, *, (,), _, +, or ~. Admin user login through Active Directory might fail if the admin username contains $ character. To reduce ambiguity when matching user information against Active Directory's User-Principal-Name (UPN) attributes, you must configure Active Directory to use Explicit UPN. Using Implicit UPN can produce ambiguous results if two users have the same value for sAMAccountName. To set Explicit UPN in Active Directory, open the Advanced Tuning page, and set the attribute REGISTRY.Services\lsass\Parameters\Providers\ActiveDirectory\UseExplicitUPN to 1. Cisco ISE supports retrieving Boolean attributes from Active Directory and LDAP identity stores. You can configure the Boolean attributes while configuring the directory attributes for Active Directory or LDAP. These attributes are retrieved upon authentication with Active Directory or LDAP. The Boolean attributes can be used for configuring policy rule conditions. The Boolean attribute values are fetched from Active Directory or LDAP server as String type. Cisco ISE supports the following values for the Boolean attributes: Boolean attribute Supported values True t, T, true, TRUE, True, 1 False f, F, false, FALSE, False, 0 Note Attribute substitution is not supported for the Boolean attributes. If you configure a Boolean attribute (for example, msTSAllowLogon) as String type, the Boolean value of the attribute in the Active Directory or LDAP server will be set for the String attribute in Cisco ISE. You can change the attribute type to Boolean or add the attribute manually as Boolean type. Page 17 You can monitor recent RADIUS authentications as they occur, from the Live Authentications window. The window displays the top ten RADIUS authentications in the last 24 hours. This section explains the functions of the Live Authentications window. The Live Authentications window shows the live authentication entries corresponding to the authentication events as they happen. In addition to authentication entries, this window also shows the live session entries corresponding to the events. You can also drill-down a session to view a detailed report corresponding to that session. The Live Authentications window provides a tabular account of recent RADIUS authentications, in the order in which they occur. The last update shown at the bottom of the Live Authentications window shows the date of the server, time, and timezone. Note If the password attribute in an Access-Request packet is empty, an error message is triggered and the access request fails. When a single endpoint is authenticated successfully, two entries appear in the Live Authentications window—one corresponding to the authentication record and another corresponding to the session record (pulled from the session live view). Subsequently, when the device performs another successful authentication, the repeat counter corresponding to the session record is incremented. The Repeat Counter that appears in the Live Authentications window shows the number of duplicate RADIUS authentication success messages that are suppressed. See the Live Authentication data categories that are shown by default. These are described in the Recent RADIUS Authentications section. You can choose to view all the columns, or only selected data columns. After selecting the columns that you want to be displayed, you can save your selections.

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