Cisco ise configuration guide gui

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Cisco ise configuration guide. Cisco ise configuration guide 2.7.

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 Security Group Tag Exchange Protocol. 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 and Cisco pxGrid persona with the Cisco ISE Advantage license. Note Cisco pxGrid should be defined in order to work with the Passive ID Work Center. For more information, see PassiveID Work Center. Page 2 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 3 Note From Cisco ISE Release 3.1, all pxGrid connections must be based on pxGrid 2.0. pxGrid 1.0-based (XMPP-based) integrations will cease to work on Cisco ISE from Release 3.1 onwards. pxGrid Version 2.0, which is based on WebSockets, was introduced in Cisco ISE Release 2.4. We recommend that you plan and upgrade your other systems to pxGrid 2.0-compliant versions in order to prevent potential disruptions, if any, to integrations. Cisco pxGrid is an open and scalable Security Product Integration Framework that allows for bi-directional any-to-any partner platform integrations. pxGrid 2.0 uses REST and WebSocket interfaces. A client uses REST for control messages, queries and application data, and WebSockets for pushing events. For more information about pxGrid 2.0, see Welcome to Learning Cisco Platform Exchange Grid (pxGrid). Cisco pxGrid can: Share context-sensitive information from the Cisco ISE session directory with other network systems, such as ISE Eco system partner systems and other Cisco platforms. Enable third-party systems to invoke adaptive network control actions to quarantine users and devices in response to a network or security event. TrustSec information, such as tag definition, value, and description, pass from Cisco ISE via a TrustSec topic to other networks. Send endpoint profiles with Fully Qualified Names (FQNs) from Cisco ISE to other networks through an endpoint profile meta topic. Bulk download of tags and endpoint profiles. Publish and subscribe to SXP bindings (IP-SGT mappings) through pxGrid. For more information about SXP bindings, see the Security Group Tag Exchange Protocol section in the Segmentation chapter of the Cisco ISE Administrators Guide. Cisco pxGrid Context-in enables ecosystem partners to publish topic information into Cisco ISE. This enables Cisco ISE to take action based on the identified asset in the ecosystem. For more information about Cisco pxGrid Context-in, see pxGrid Context-In. pxGrid has the following components: Controller: Handles Discovery, Authentication, and Authorization. Provider: Returns query results or publishes. Pubsub: Provides pxGrid services to providers and consumers. Subscriber: Once authorized, subscribers get the contextual information and alerts from topics that they subscribe to. pxGrid provides the following functions: Discovery: Discovers service properties based on service name. The flow starts when a provider asks to "Register Service" with the pxGrid Controller. After registration, the consumer uses "Lookup Service" to discover the locations of the providers. Authentication: The pxGrid Controller authenticates the pxGrid client for access to services. Credentials are either username and password, or certificates (preferred). Authorization: When pxGrid gets an operation request, it consults with pxGrid Controller to authorize the request. pxGrid assigns the client to a pre-defined group. pxGrid 2.0 nodes operate in an Active/Active configuration. For high availability, there should be at least two pxGrid nodes in the deployment. Large deployments can have up to four nodes for increased scale and redundancy. We recommend that you configure IP addresses for all nodes, so that if one node goes down, that node's clients connect to working node. When the PAN goes down, pxGrid server stops handling the activations. Manually promote the PAN to activate the pxGrid server. For more information about pxGrid deployments, see ISE Performance & Scale . All pxGrid service provider clients periodically reregister themselves with the pxGrid controller within a span of 7.5 minutes. If the client does not reregister, the PAN node assumes it's inactive, and deletes that client. If the PAN node goes down for more than 7.5 minutes, when it comes back up it deletes all the clients with timestamp values older than 7.5 minutes. All those clients must then register again with the pxGrid controller. pxGrid 2.0 clients used WebSocket and REST-based APIs for pub/sub and query. These APIs are served by the ISE application server on port 8910. The pxGrid processes shown by show logging application pxgrid don't apply to pxGrid 2.0. Note All the references to pxGrid 1.0 processes in the GUI and the CLI have been removed. In Cisco ISE 3.0, we added sequence IDs to pxGrid topics. If there is a break in transmission, the subscriber can recognize that by checking the gap in sequence of IDs. The subscriber notices the change in topic sequence ID, and asks for data based on the date of last sequence number. If the Publisher goes down, when it comes back up, topic sequence starts at 0. When the Subscriber sees sequence 0, they must clear the cache and start bulk download. If subscriber goes down, the publisher keeps assigning sequential IDs. When the subscriber reconnects, and sees a gap in sequence IDs, the subscriber asks for data from time of the last sequence number. Loss detection works with Session Directory, and TrustSec Configuration. With Session Directory, when the client detects a loss, they must clear the cache and start bulk download. If you have an existing application that doesn't use sequence IDs, you don't have to use them. But using them provides benefits of loss detection and recovery from loss. Session Directory sessions are batched and published by MnT asynchronously for every notify interval to /topic/com.cisco.ise.session. Changes to Trust Sec Config Security Group Security Groups are published to /topic/com.cisco.ise.config.trustsec.security.group. Loss Detection is only supported for pxGrid 2.0, and is on by default. To see code examples of using Loss Detection, see . The following logs are available for pxGrid: pxgrid-server.log: pxGrid 2.0 activities and errors The Log page displays all the pxGrid 2.0 management events. Event info includes the client and capability names along with the event type and timestamp. Navigate to Administration > pxGrid Services > Diagnostics > Log to view the list of events. You can also clear the logs and resynchronize or refresh the list. The Summary page displays statistics of the current pxGrid 2.0 environment. Current Connections: Lists the connections to the controller Control Messages: Authentication, Authorization, and service Discovery REST APIs: Number of clients who connected using WebSockets or XMPP Pubsub Throughput: Amount of data published to clients Clients: Clients connected by REST or WebSocket Errors: Number of transmission errors, which caused client to ask for data transfer restart Websocket: The Administration > pxGrid Services > Diagnostics > Websocket page lists pxGrid 2.0 clients, external and internal. It also lists the available pxGrid 2.0 topics, and the clients that publish or subscribe to each one. Log: The Administration > pxGrid Services > Diagnostics > Live Logs page lists management events. Tests: On the Administration > pxGrid Services > Diagnostics > Tests page, the Health Monitoring test verifies that a client can access the Session Directory service. When you click the Start Test button, we create an internal pxGrid 2.0 client. This client queries the bulk session download REST API, and then subscribes to the session topic. It listens on that topic for a few minutes, and then terminates. When the test is complete, you can display a log of the test activities. Automatically approve new certificate-based accounts: Off by default, gives you control over connections to the pxGrid server. Only check this setting when you trust all clients in your environment. Allow password based account creation: Check this check box to enable username/password based authentication for pxGrid clients. If you enable this option, the pxGrid clients aren't automatically approved. Page 4 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. Authentication with an external identity source is more secure than using the internal database. Role-based access control (RBAC) for CLI administrators supports an external identity store. You must have defined Admin users, and added them to an Administrator group. The Admin must be a Super Admin. Using the Windows server running Active Directory, modify the attributes for each user that you plan to configure as a CLI Administrator. From the Server Manager window, choose > [ad.adserver] .local. Enable Advanced Features under the View menu so that you can edit a user's attributes. Navigate to the Active Directory group that contains a list of all the admin user and select a user. Double-click the user to open the Properties window. Click the Attribute Editor. Click any attribute and start entering "gid" to locate the gidNumber. If you don't find the gidNumber attribute, click the Filter button and un-check Show only attributes that have values. Double-click an attribute name to edit each attribute. For each user: Assign a uidNumber greater than 60000, and make sure that the number is unique. Do not change the uidNumber after assignment. Assign gidNumber as 110 or 111. While 110 denotes an admin user, whereas 111 denotes a read-only user. If you modify the gidNumber, wait for at least five minutes before making an SSH connection. Connect to the Cisco ISE CLI, run the identity-store command, and assign the Admin user to the ID store. For example, to map the CLI admin user to the Active Directory defined in ISE as adpool1, run the identity-store active-directory domain-name adpool1 user admincliuser command. After the join is complete, connect to the Cisco ISE CLI and log in as the Admin CLI user to verify your configuration. If the domain you use in this command was previously joined to the ISE node, you must rejoin the domain in the Administrators console. In the Cisco ISE GUI, click the Menu icon () and choose Administration > Identity Management > External Identity Sources. In the left-hand pane, click Active Directory and select your Active Directory name. Note If you test the connection with the test user using either MS-RPC or Kerberos, the status for your Active Directory connection might show Operational, but error messages are displayed. Verify that you can still log in to the Cisco ISE CLI as the Admin CLI user. Page 5 Cisco ISE supports device administration using the Terminal Access Controller Access-Control System (TACACS+) security protocol to control and audit the configuration of network devices. The network devices are configured to query Cisco ISE for authentication and authorization of device administrator actions, and send accounting messages for Cisco ISE to log the actions. It facilitates granular control of who can access which network device and change the associated network settings. A Cisco ISE administrator can create policy sets that allow TACACS results, such as command sets and shell profiles, to be selected in authorization policy rules in a device administration access service. The Cisco ISE Monitoring node provides enhanced reports related to device administration. The Work Center menu contains all the device administration pages, which act as a single start point for ISE administrators. Cisco ISE requires a Device Administration license to use TACACS+. There are two types of administrators for device administration: Device Administrator Cisco ISE Administrator The device administrator is the user who logs into the network devices such as switches, wireless access points, routers, and gateways, (normally through SSH), in order to perform the configuration and maintenance of the administered devices. The Cisco ISE administrator logs into Cisco ISE to configure and coordinate the devices that a device administrator logs in to. The Cisco ISE administrator is the intended reader of this document, who logs into Cisco ISE to configure the settings that control the operations of the device administrator. The Cisco ISE administrator uses the device administration features (In the Cisco ISE GUI, click the Menu icon () and chooseWork centers > Device Administration) to control and audit the configuration of the network devices. A device can be configured to query the Cisco ISE server using the Terminal Access Controller Access-Control System (TACACS) security protocol. The Cisco ISE Monitoring node provides enhanced reports related to device administration. A Cisco ISE administrator can perform the following tasks: Configure network devices with the TACACS+ details (shared secret). Add device administrators as internal users and set their enable passwords as needed. Create policy sets that allow TACACS results, such as command sets and shell profiles, to be selected in authorization policy rules in a device administration access service. Configure the TACACS server in Cisco ISE to allow device administrators to access devices based on the policy sets. The device administrator performs the task of setting up a device to communicate with the Cisco ISE server. When a device administrator logs on to a device, the device queries the Cisco ISE server, which in turn queries an internal or external identity store, to validate the details of the device administrator. When the validation is done by the Cisco ISE server, the device informs the Cisco ISE server of the final outcome of each session or command authorization operation for accounting and auditing purposes. A Cisco ISE administrator can manage device administration using TACACS and Cisco ISE 2.0 and later releases. The configuration related to device administration can also be migrated from a Cisco Secure Access Control System (ACS) server, versions 5.5, 5.6, 5.7 and 5.8. Prior versions need to be upgraded to 5.5 or 5.6 before migration. Note You should check the Enable Device Admin Service check box in the Administration > System > Deployment > General Settings page to enable TACACS+ operations. Ensure that this option is enabled in each PSN in a deployment. Due to a known limitation of TACACS+ protocol to create a secure connection between switch or router and Cisco ISE, ensure that IPsec protocol is deployed between the two parties. Page 6 When a smart license token is active and registered in the Cisco ISE administration portal, the CSSM monitors the consumption of licenses by each endpoint session per product license. Smart Licensing notifies the administrator about license consumption by endpoint sessions with a simple table layout in Cisco ISE. Smart Licensing reports the peak usage of each enabled license to the centralized database daily. When licenses are available and not consumed, the administrator is notified of available licenses and can continue to monitor usage. When consumption exceeds the number of licenses available, an alarm is activated and the administrator is notified through alarms and notifications. With Smart Licensing, you can also manage the different license entitlements included through your Cisco Smart Account, such as Essentials, Advantage, Premier, or Device Admin. From Cisco ISE, you can monitor basic consumption statistics per license entitlement. From your CSSM account, you can view additional information, statistics, and notifications, as well as make changes to your account and entitlements. Cisco ISE takes internal samples of license consumption every 30 minutes. License compliancy and consumption is updated accordingly. To view this information in the Licenses table in Cisco ISE, from the main menu, choose , and click Refresh. From the time you register your Cisco ISE Primary Administration node (PAN) with the CSSM, Cisco ISE reports peak counts of license consumption to the CSSM server every six hours. The peak count reports help ensure that license consumption in Cisco ISE is in compliance with the licenses purchased and registered. Cisco ISE communicates with the CSSM server by storing a local copy of the CSSM certificate. The CSSM certificate is automatically reauthorized during the daily synchronization, and when you refresh the Licenses table. Typically, CSSM certificates are valid for six months. If there is a change in the compliance status when Cisco ISE synchronizes with the CSSM server, the Last Authorization column of the Licenses table is updated accordingly. In addition, when entitlements are no longer compliant, the number of days for which they are out of compliancy appears in the Days Out of Compliancy column. Noncompliancy is also indicated in the notifications displayed at the top of the Licensing area, and on the Cisco ISE toolbar next to the License Warning link. In addition to notifications, you can view alarms. Note Device Admin licenses are authorized when Cisco ISE communicates with the CSSM server, but they are not session-based, and therefore, no consumption count is associated with them in the Licenses table. The compliance column of the Licenses table displays one of the following values: In Compliance: The use of this license is in compliance. Released Entitlement: The licenses have been purchased and released for use, but none have been consumed so far in this Cisco ISE deployment. In such a scenario, the Consumption Count for the license is 0. Evaluation: Evaluation licenses are available for use. Endpoint license consumption relies on the attributes that are used in the authorization policy with which an endpoint is matched. Consider a scenario where you only have a Cisco ISE Essentials license registered in your system (you deleted the 90-day Evaluation license). You will be able to see and configure the corresponding Cisco ISE Essentials menu items and features. If you configure an authorization policy to use a feature, for example, if you use the Session:PostureStatus attribute that requires an Advantage license, and an endpoint matches this authorization policy, then: The endpoint consumes an Cisco ISE Advantage license, despite the fact that a Cisco Advantage license has not been registered in the system. You see notifications of noncompliant license consumption whenever you log in. Cisco ISE displays notifications and alarms with the message Exceeded license usage than allowed. This is because there are no Cisco ISE Advantage licenses that are registered in CSSM for your Cisco ISE, but an endpoint is consuming one. Note The licensing alarm is displayed for about 60 days from the first occurrence of non-compliant license use, even if you fix the licensing issue by registering the necessary licenses. If the use of all three Tier licenses is out of compliance for 45 days in a 60-day period, administrative control of Cisco ISE is lost until you register the correct licenses. You will be able to access only the Licensing window in the Cisco ISE administration portal until the correct licenses are registered. However, Cisco ISE continues to handle authentications. Because of the configuration of an authorization policy, the Licensing table reports that Cisco ISE has used a license that you have not purchased and registered. Before you purchase a Advantage or Premier license, the Cisco ISE administration portal does not display the features covered by these licenses. However, after you purchase these licenses, the GUI continues to display the features that they enable even after the license has expired or endpoint consumption of the license has exceeded a set limit. Thus, you can configure the features even if you do not currently have a valid license for them. In the Cisco ISE administration portal, click the Menu icon () and choose , identify the authorization rule that is using the feature for which you do not have a registered license, and reconfigure that rule. Page 7 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 8 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. Page 9 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 10 In Cisco ISE Release 2.7, there is a basic implementation of synchronizing SGT and SXP mappings with the Internal Endpoint Groups (IEPGs), External Endpoint Groups (EEPGs), and endpoint configuration of Cisco ACI. Cisco ISE Release 3.0 supports an extra implementation that provides enhanced conversion of information exchange and cross-domain automation for a Cisco Software-Defined Access (SD-Access) fabric with Cisco ACI infrastructure. This implementation supports the following: Exchange and translation of EPG and SGT information Extension of Cisco SD-Access virtual networks into the Cisco ACI fabric Cisco SD-Access and Cisco ACI fabric dataplane automation Exchange of IP-SGT bindings Send the bindings to pxGrid and SXP domains Cisco ISE learns the virtual network information from RADIUS bindings or Cisco ACI bindings, and provides a local static mapping for a specific virtual network. A virtual network can be used to enhance the SXP filter logic that is leveraged to coordinate the sharing of IP-SGT bindings with Cisco ACI. Note that the SXP domains and virtual networks are closely linked, in the sense that the virtual networks that are extended to Cisco ACI are the only constructs to share IP-SGT bindings with Cisco ACI. Therefore, specific SXP domains (denoted with the SD-Access- prefix) are mapped to the equivalent virtual network (SXP domain minus the SD-Access- prefix) in Cisco ISE. In order to allow the Cisco SD-Access border node to know about the Cisco ACI bindings, the Cisco ACI bindings are replicated as if they were originated from all the extended virtual networks before they are sent through the SXP filter logic. For example, a binding from Cisco ACI with the original Cisco ACI virtual network is sent through the SXP filter four times, if Cisco SD-Access virtual network 1, virtual network 2 and virtual network 3 are extended to Cisco ACI. This exact same binding goes through the filter for all the four virtual networks. The filters can be modified and customized as per specific deployment requirements. However, the replication will always happen for all extended virtual networks. Cisco ISE learns about the IP-SGT, EPG bindings from Cisco ACI whenever possible. However, Cisco ISE cannot force Cisco ACI to learn about any bindings. Cisco ACI has to explicitly request for the bindings from Cisco ISE. The following table lists the source and destination combinations that are possible for IP-SGT or IP-EPG bindings in Cisco ISE. Source Domain Destination Domain Source Grouping Destination Grouping Notes Cisco ACI SXP Cisco ACI virtual network SXP domain Cisco ACI virtual network can be used as a key in the SXP filter to share the binding with one or more SXP domains. Cisco ACI PxGrid Cisco ACI virtual network VPN for SXP topic on PxGrid Cisco ACI virtual network can be used as a key in the SXP filter to share the binding with one or more SXP VPNs on pxGrid. Cisco ACI Cisco SD-Access border node Cisco SD-Access extended virtual network SXP domain The Cisco ACI bindings are shared with all the SXP domains that are auto-created for the border node virtual network information exchange ("SD-Access-" prefixed domains). Cisco ISE static mapping SXP Cisco SD-Access virtual network or existing SXP domain SXP domain The static bindings can be sent to the SXP domain either directly (specify SXP domain in static mapping) or through the SXP filter (along with the virtual network information). If no virtual network is specified, then the SXP filter uses the DEFAULT_VN for the virtual network. Cisco ISE static mapping pxGrid Cisco SD-Access virtual network SXP domain The static bindings can be sent to the SXP domain either directly (specify SXP domain in static mapping) or through the SXP filter (along with the virtual network information). If no virtual network is specified, then the SXP filter uses the DEFAULT_VN for the virtual network. Cisco ISE static mapping Cisco ACI Cisco SD-Access virtual network Cisco SD-Access virtual network The Cisco SD-Access virtual network must be extended into Cisco ACI (mdpExtendvirtual networkReq) and the binding uses the virtual network in the SXP filter to send the binding to Cisco ACI, with the SXP domain mapped to a virtual network. SXP pxGrid SXP domain SXP domain The SXP domain shows up as a VPN in the SXP topic on pxGrid. SXP Cisco ACI SXP domain Cisco SD-Access virtual network SXP domain sharing is selected under Cisco ACI settings. Only the SXP Domain which is auto-created by the Cisco SD-Access virtual network (virtual network equivalent SXP Domain), is shared. The Cisco SD-Access virtual network should be extended to Cisco ACI for the virtual network to have a chance of sharing the bindings. The bindings must be a part of the consumer service for which Cisco ACI requests endpoint data. SXP SXP Domain SXP Domain SXP bindings that make it through prioritization are shared. RADIUS bindings Cisco ACI Cisco SD-Access virtual network Cisco SD-Access virtual network The RADIUS bindings are sent through SXP filter (along with the virtual network information). If no virtual network is specified for the binding, then the SXP filter uses DEFAULT_VN for the virtual network. RADIUS bindings pxGrid Cisco SD-Access virtual network Cisco SD-Access virtual network The RADIUS bindings make it to the session directory topic on pxGrid with the virtual network field added to the topic. RADIUS bindings SXP Cisco SD-Access virtual network SXP domain Cisco SD-Access virtual network can be used as a key in the SXP filter to select an SXP domain to share the binding with. To promote cross-domain support, you must have the ability to exchange and filter the various network forwarding domains, for example, IP address, subnet mask, Security Group Tag, EPGs, virtual networks, Virtual Routing and Forwarding(VRF), from one policy domain, or a forwarding domain within a policy domain, to another and vice versa. This is especially important when a policy domain, for example Cisco SD-Access, Cisco ACI, SD-WAN, CPC, and Meraki, has multiple forwarding domains. You can identify, capture, and store the policy domain's network-specific forwarding domain and the domain-specific attributes for all the sessions and bindings learned from other policy domains. These will be used by the policy administrator to filter the sessions and bindings into specific SXP domains. In addition, it enables the administrator to create policies that map or filter only certain bindings from one forwarding domain to another. From Cisco ISE 3.0 onwards, with every virtual network learnt by the Cisco ISE from Cisco DNA Center, you will find an automatically created SXP filter and an SXP domain in the SXP Devices window. To view this window, click the Menu icon () and choose Work Centers > TrustSec > SXP > SXP Devices. These SXP domains will, in turn, be used to set the virtual networks in the bindings shared with Cisco ACI. You can add and edit virtual networks to IP-SGT static mappings in the IP-SGT Static mapping window. To view this window, click the Menu icon () and choose Work Centers > TrustSec > Components > IP SGT Static Mapping. Click Add to add a new mapping, or click Edit to modify an existing mapping. Figure 13. Add virtual network in IP SGT Static Mapping You can also include virtual networks in the SXP domain filter to specify which SXP domain to send the mapping to when the mapping received by Cisco ISE is mapped to a particular virtual network. To view this window, click the Menu icon () and choose Work Centers > TrustSec > SXP > SXP Devices > All SXP Mappings and click Add SXP Domain Filter. The bindings learned by Cisco ACI have the original Cisco ACI virtual network, and these are sent to the SXP domain configured in the filter. This filter also influences how a binding is sent to the Cisco ACI. Figure 14. Add virtual network information in SXP Device Filter Page 11 A logging category is a bundle of message codes that describe a function, a flow, or a use case. In Cisco ISE, each log is associated with a message code that is bundled with the logging categories according to the log message content. Logging categories help describe the content of the messages that they contain. Logging categories promote logging configuration. Each category has a name, target, and severity level that you can set, as per your application requirement. Cisco ISE provides predefined logging categories for services, such as Posture, Profiler, Guest, AAA (authentication, authorization, and accounting), and so on, to which you can assign log targets. For the logging category Passed Authentications, the option to allow local logging is disabled by default. Enabling local logging for this category will result in high utilization of operational space, and fill prrt-server.log along with the iseLocalStore.log. If you choose to enable local logging for Passed Authentications, go to , click Passed Authentications from the category section, and check the check box against Local Logging. Page 12 Threat Centric Network Access Control (TC-NAC) feature enables you to create authorization policies based on the threat and vulnerability attributes received from the threat and vulnerability adapters. Threat severity levels and vulnerability assessment results can be used to dynamically control the access level of an endpoint or a user. You can configure the vulnerability and threat adapters to send high fidelity Indications of Compromise (IoC), Threat Detected events, and CVSS scores to Cisco ISE, so that threat-centric access policies can be created to change the privilege and context of an endpoint accordingly. Cisco ISE supports the following adapters: SourceFire FireAMP Cognitive Threat Analytics (CTA) adapter Qualys Note Only the Qualys Enterprise Edition is currently supported for TC-NAC flows. Rapid7 Nexpose Tenable Security Center When a threat event is detected for an endpoint, you can select the MAC address of the endpoint on the Compromised Endpoints window and apply an ANC policy, such as Quarantine. Cisco ISE triggers CoA for that endpoint and applies the corresponding ANC policy. If ANC policy is not available, Cisco ISE triggers CoA for that endpoint and applies the original authorization policy. You can use the Clear Threat and Vulnerabilities option on the Compromised Endpoints window to clear the threat and vulnerabilities associated with an endpoint (from Cisco ISE system database). The following attributes are listed under the Threat dictionary: CTA-Course_Of_Action (values can be Internal Blocking, Eradication, or Monitoring) Qualys-CVSS_Base_Score Qualys-CVSS_Temporal_Score Rapid7 Nexpose-CVSS_Base_Score Tenable Security Center-CVSS_Base_Score Tenable Security Center-CVSS_Temporal_Score The valid range is from 0 to 10 for both Base Score and Temporal Score attributes. When a vulnerability event is received for an endpoint, Cisco ISE triggers CoA for that endpoint. However, CoA is not triggered when a threat event is received. You can create an authorization policy by using the vulnerability attributes to automatically quarantine the vulnerable endpoints based on the attribute values. For example: Any Identity Group & Threat:Qualys-CVSS_Base_Score > 7.0 -> Quarantine To view the logs of an endpoint that is automatically quarantined during CoA events, choose . To view the logs of an endpoint that is quarantined manually, choose . Note the following points while enabling the Threat Centric NAC service: The Threat Centric NAC service requires a Cisco ISE Advantage license. Threat Centric NAC service can be enabled on only one node in a deployment. You can add only one instance of an adapter per vendor for Vulnerability Assessment service. However, you can add multiple instances of FireAMP adapter. You can stop and restart an adapter without losing its configuration. After configuring an adapter, you can stop the adapter at any point of time. The adapter would remain in this state even when the ISE services are restarted. Select the adapter and click Restart to start the adapter again. Note When an adapter is in Stopped state, you can edit only the name of the adapter instance; you cannot edit the adapter configuration or the advanced settings. You can view the threat information for the endpoints on the following pages: Home page > Threat dashboard Context Visibility > Endpoints > Compromised Endpoints The following alarms are triggered by the Threat Centric NAC service: Adapter not reachable (syslog ID: 91002): Indicates that the adapter cannot be reached. Adapter Connection Failed (syslog ID: 91018): Indicates that the adapter is reachable but the connection between the adapter and source server is down. Adapter Stopped Due to Error (syslog ID: 91006): This alarm is triggered if the adapter is not in the desired state. If this alarm is displayed, check the adapter configuration and server connectivity. Refer to the adapter logs for more details. Adapter Error (syslog ID: 91009): Indicates that the Qualys adapter is unable to establish a connection with or download information from the Qualys site. The following reports are available for the Threat Centric NAC service: Adapter Status: The Adapter Status report displays the status of the threat and vulnerability adapters. COA Events: When a vulnerability event is received for an endpoint, Cisco ISE triggers CoA for that endpoint. The CoA Events report displays the status of these CoA events. It also displays the old and new authorization rules and the profile details for these endpoints. Threat Events: The Threat Events report provides a list of all the threat events that Cisco ISE receives from the various adapters that you have configured. Vulnerability Assessment events are not included in this report. Vulnerability Assessment: The Vulnerability Assessment report provides information about the assessments that are happening for your endpoints. You can view this report to check if the assessment is happening based on the configured policy. You can view the following information from Operations > Reports > Diagnostics > ISE Counters > Threshold Counter Trends: Total number of events received Total number of threat events Total number of vulnerability events Total number of CoAs issued (to PSN) The values for these attributes are collected every 5 minutes, so these values represent the count for the last 5 minutes. The Threat dashboard contains the following dashlets: Total Compromised Endpoints dashlet displays the total number of endpoints (both connected and disconnected endpoints) that are currently impacted on the network. Compromised Endpoints Over Time dashlet displays a historical view of the impact on endpoints for the specified time period. Top Threats dashlet displays the top threats based on the number of endpoints impacted and the severity of the threat. You can use the Threats Watchlist dashlet to analyze the trend of selected events. The size of the bubbles in the Top Threats dashlet indicates the number of endpoints impacted and the light shaded area indicates the number of disconnected endpoints. The color as well as the vertical scale indicate the severity of the threat. There are two categories of threat—Indicators and Incidents. The severity attribute for Indicator is "Likely_Impact" and the severity attribute for Incident is "Impact_Qualification". The Compromised Endpoint window displays the matrix view of the endpoints that are impacted and the severity of the impact for each threat category. You can click on the device link to view the detailed threat information for an endpoint. The Course Of Action chart displays the action taken (Internal Blocking, Eradication, or Monitoring) for the threat incidents based on the CTA-Course_Of_Action attribute received from the CTA adapter. The Vulnerability dashboard on the Home page contains the following dashlets: Total Vulnerable Endpoints dashlet displays the total number of endpoints that have a CVSS score greater than the specified value. Also displays the total number of connected and disconnected endpoints that have a CVSS score greater than the specified value. Top Vulnerability dashlet displays the top vulnerabilities based on the number of endpoints impacted or the severity of the vulnerability. The size of the bubbles in the Top Vulnerability dashlet indicates the number of endpoints impacted and the light shaded area indicates the number of disconnected endpoints. The color as well as the vertical scale indicates the severity of the vulnerability. You can use the Vulnerability Watchlist dashlet to analyze the trend of selected vulnerabilities over a period of time. Click the search icon in the dashlet and enter the vendor-specific id ("qid" for Qualys ID number) to select and view the trend for that particular ID number. The Vulnerable Endpoints Over Time dashlet displays a historical view of the impact on endpoints over time. The Endpoint Count By CVSS graph on the Vulnerable Endpoints window shows the number of endpoints that are affected and their CVSS scores. You can also view the list of affected endpoints on the Vulnerable Endpoints window. You can click the device link to view the detailed vulnerability information for each endpoint. Threat Centric NAC service logs are included in the support bundle. Threat Centric NAC service logs are located at support/logs/TC-NAC/ Cisco ISE integrates with the following Vulnerability Assessment (VA) Ecosystem Partners to obtain vulnerability results of endpoints that connect to the Cisco ISE network: Qualys: Qualys is a cloud-based assessment system with scanner appliances deployed in the network. Cisco ISE allows you to configure an adapter that communicates with Qualys and obtains the VA results. You can configure the adapter from the Admin portal. You need a Cisco ISE administrator account with Super Admin privileges to configure the adapter. The Qualys adapter uses REST APIs to communicate with the Qualys Cloud Service. You need a user account in Qualys with Manager privileges to access the REST APIs. Cisco ISE uses following Qualys REST APIs: Host Detection List API: To check the last scan results of the endpoint Scan API: To trigger an on-demand scan of the endpoint Qualys enforces limits on the number of API calls that subscribed users can make. The default rate limit count is 300 per 24 hours. Cisco ISE uses Qualys API version 2.0 to connect to Qualys. Refer to the Qualys API V2 User Guide for more information on these API functions. Rapid7 Nexpose: Cisco ISE integrates with Rapid 7 Nexpose, a vulnerability management solution, to help detect vulnerabilities and enables you to respond to such threats quickly. Cisco ISE receives the vulnerability data from Nexpose and based on the policies that you configure in ISE, it quarantines the affected endpoints. From the Cisco ISE dashboard, you can view the affected endpoint and take appropriate action. Cisco ISE has been tested with Nexpose Release 6.4.1. Tenable SecurityCenter (Nessus scanner): Cisco ISE integrates with Tenable SecurityCenter and receives the vulnerability data from Tenable Nessus scanner (managed by Tenable SecurityCenter) and based on the policies that you configure in ISE, it quarantines the affected endpoints. From the Cisco ISE dashboard, you can view the affected endpoints and take appropriate action. Cisco ISE has been tested with Tenable SecurityCenter 5.3.2. The results from the ecosystem partner are converted in to a Structured Threat Information Expression (STIX) representation and based on this value, a Change of Authorization (CoA) is triggered, if needed, and the appropriate level of access is granted to the endpoint. The time taken to assess endpoints for vulnerabilities depends on various factors and hence VA cannot be performed in real time. The factors that affect the time taken to assess an endpoint for vulnerabilities include: Vulnerability assessment ecosystem Type of vulnerabilities scanned for Type of scans enabled Network and system resources allocated by the ecosystem for the scanner appliances In this release of Cisco ISE, only endpoints with IPv4 addresses can be assessed for vulnerabilities. Page 13 Profiler conditions, exception actions, and NMAP scan actions are classified as Cisco-provided or administrator-created, as shown in the System Type attribute. Endpoint profiling policies are classified as Cisco-provided, administrator-created, or administrator- modified. These classifications are shown in the System Type attribute. You can perform different operations on the profiler conditions, exception actions, NMAP scan actions, and endpoint profiling policies depending on the System Type attribute. You cannot edit or delete Cisco-provided conditions, exception actions, and nmap scan actions. You can not delete Endpoint policies that are provided by Cisco. When you edit policies, they are called administrator-modified. When the feed service updates policies, the administrator-modified policies are replaced by the up-to-date version of the Cisco-provided policy that it was based on. You can retrieve new and updated endpoint profiling policies and the updated OUI database from the Cisco feed server. You must have a subscription to Cisco ISE. You can also receive e-mail notifications about applied, success, and failure messages. You can send the anonymous information back to Cisco about feed service actions, which helps Cisco improve the feed service. The OUI database contains the MAC OUIs assigned to vendors. The OUI list is available here: Cisco ISE downloads policies and OUI database updates every day at 1:00 A.M of the local Cisco ISE server time zone. Cisco ISE automatically applies these downloaded feed server policies, and stores the the changes so that you can revert to the previous state. When you revert to a previous state, the new endpoint profiling policies are removed and updated endpoint profiling policies are reverted to the previous state. In addition, the profiler feed service is automatically disabled. You can also update the feed services manually in offline mode. You can download the updates manually by using this option if you cannot connect your ISE deployments to Cisco feed service. Note Updates from the Feed Service are not allowed after the license goes Out of Compliance (OOC) for 45 days within a 60-day window period. The license is out of compliance when it has expired, or when the usage exceeds the allowed number of sessions. Page 14 A trusted certificate in CTL may contain a name constraint extension. This extension defines a namespace for values of all subject name and subject alternative name fields of subsequent certificates in a certificate chain. Cisco ISE does not check constraints that are specified in a root certificate. Cisco ISE supports the following name constraints: Directory name The directory name constraint should be a prefix of the directory name in the subject or subject alternative name field. For example: Correct subject prefix: CA certificate name constraint: Permitted: O=Cisco Client certificate subject: O=Cisco,CN=Salomon Incorrect subject prefix: CA certificate name constraint: Permitted: O=Cisco Client certificate subject: CN=Salomon,O=Cisco DNS Email URI (The URI constraint must start with a URI prefix such as http://, https://, ftp://, or ldap://). Cisco ISE does not support the following name constraints: When a trusted certificate contains a constraint that is not supported and the certificate that is being verified does not contain the appropriate field, Cisco ISE rejects the certificate because it cannot verify unsupported constraints. The following is an example of the name constraints definition within the trusted certificate: X509v3 Name Constraints: critical Permitted: othername: email:.abcde.at email:.abcde.be email:.abcde.bg email:.abcde.by DNS:.dir DirName: DC = dir, DC = emea DirName: C = AT, ST = EMEA, L = AT, O = ABCDE Group, OU = Domestic DirName: C = BG, ST = EMEA, L = BG, O = ABCDE Group, OU = Domestic DirName: C = BE, ST = EMEA, L = BN, O = ABCDE Group, OU = Domestic DirName: C = CH, ST = EMEA, L = CH, O = ABCDE Group, OU = Service Z100 URI:.dir IP:172.23.0.171/255.255.255.255 Excluded: DNS:.dir URI:.dir An acceptable client certificate subject that matches the above definition is as follows: Subject: DC=dir, DC=emea, OU=+DE, OU=OU-Administration, OU=Users, OU=X1, CN=cwinwell Page 15 Mobile Device Management (MDM) servers secure, monitor, manage, and support mobile devices that are deployed across mobile operators, service providers, and enterprises. Traditionally, MDM servers have only supported mobile devices. Some MDM servers now manage all types of devices in a network (mobile phones, tablets, laptops, and desktops) and are called Unified Endpoint Management (UEM) servers. MDM servers act as a policy server that controls the use of some applications on a mobile device (for example, an email application) in the deployed environment. Cisco ISE queries a connected MDM server for information about various attributes that you can use to create network authorization policies. You can run multiple active MDM servers on your network, from different vendors. This allows you to route different endpoints to different MDM servers based on device factors such as location or device type. Cisco ISE also integrates with MDM servers using the Cisco MDM Server Info APIs, Version 2 and later versions, to allow devices to access the network over VPN via Cisco AnyConnect 4.1 and Cisco Adaptive Security Appliances 9.3.2 or later. In the following illustration, Cisco ISE is the enforcement point and the MDM policy server is the policy information point. Cisco ISE obtains data from the MDM server to provide a complete solution. Figure 3. MDM Interoperability with Cisco ISE Configure Cisco ISE to interoperate with one or more external MDM servers. By setting up this type of third-party connection, you can use the detailed information available in the MDM database. Cisco ISE uses REST API calls to retrieve information from the external MDM server. Cisco ISE applies the appropriate access control policies to switches, access routers, wireless access points, and other network access points. The policies give you greater control of the remote devices that are accessing the Cisco ISE-enabled network. For a list of the MDM vendors supported by Cisco ISE, see Supported Unified Endpoint Management and Mobile Device Management Servers. Cisco ISE performs the following functions with external MDM servers: Manages device registration: Unregistered endpoints that access the network are redirected to a registration page that is hosted on the MDM server. Device registration includes the user role, device type, and so on. Handles device remediation: Endpoints are granted restricted access during remediation. Augments endpoint data: The endpoint database is updated with information from the MDM server that you cannot gather using the Cisco ISE profiling services. Cisco ISE uses multiple device attributes that you can view in the Endpoints window. . The following are examples of the device attributes available. MDMImei: xx xxxxxx xxxxxx x MDMManufacturer: Apple MDMModel: iPhone MDMOSVersion: iOS 6.0.0 MDMPhoneNumber: 5550100 MDMSerialNumber: DNPGQZGUDTFx Polls the MDM server every four hours for device compliance data. Configure the polling interval in the External MDM Servers window. (To view this window, click the Menu icon () and choose . Issues device instructions through the MDM server: Cisco ISE issues remote actions for user devices through the MDM server. Initiate remote actions from the Cisco ISE administration portal through the Endpoints window. To view this window, click the Menu icon () and choose . Check the check box next to the MDM server and click MDM Actions. Choose the required action from the drop-down list displayed. When you configure an MDM server in Cisco ISE, Cisco ISE queries the MDM server for device attribute information and adds the information to the MDM system dictionary. The following attributes are used for registration status, and are commonly supported by MDM vendors. Cisco ISE uses APIs to query MDM servers for the required device attributes. Cisco ISE Release 3.1 and later releases support MDM APIs Version 3. The Version 3 APIs include APIs that allow Cisco ISE to send queries to MDM servers for device attributes that help Cisco ISE identify endpoints that use MAC address randomization. Cisco ISE queries the MDM server for the following attributes: GUID: A unique device identifier that replaces the use of MAC address to identify a device. MAC addresses: The list of MAC addresses that a UEM or MDM server has recorded for a particular device. A maximum of five MAC addresses are shared for a device. If an MDM server does not provide values for the required attributes, Cisco ISE fills the attributes fields with the default values that are mentioned in the following table. Table 15. MDM Attributes and Values Attribute Name Attribute Dictionary Default Value Data That is Expected From UEM or MDM Servers Data That is Expected From Microsoft SCCM Servers DaysSinceLastCheckin Supported from MDM API Version 3 MDM None The number of days since a user has last checked in or synchronized a device with the UEM or MDM server. The valid range is 1–365 days. The number of days since a user has last checked in or synchronized a device with the SCCM server. The valid range is 1–365 days. DeviceCompliantStatus MDM NonCompliant Compliant or NonCompliant. Compliant or NonCompliant. DeviceRegisterStatus MDM UnRegistered Registered or UnRegistered. Registered or UnRegistered. DiskEncryptionStatus MDM Off On or Off. On or Off. IMEI MDM None The IMEI number of the device. Not applicable. JailBrokenStatus MDM Unbroken Reachable or UnReachable. Reachable or UnReachable. MDMFailureReason MDM None The device failure reason. The device failure reason. MDMServerName MDM None The name of the server. The name of the server. MDMServerReachable MDM Reachable Reachable or UnReachable. Reachable or UnReachable. MEID MDM None The MEID value of the device. Not applicable. Manufacturer MDM None The name of the device manufacturer. Not applicable. Model MDM None The name of the device model. Not applicable. OsVersion MDM None The operating system version of the device. Not applicable. PhoneNumber MDM None The phone number of the device. Not applicable. PinLockStatus MDM Off On or Off. Not applicable. SerialNumber MDM None The serial number of the device. Not applicable. ServerType MDM None MDM for a Mobile Device Manager server. DM for Desktop Device Manager server. DM for Desktop Device Manager server. UDID MDM None The UDID number of the device. Not applicable. UserNotified MDM No Yes or No Not applicable. GUID Supported from MDM API Version 3 Not a Dictionary attribute None The GUID is a unique device identifier that is used to identify a device instead of the device's MAC address, UDID, MEID, or IMEI values. The GUID template is GUID:MDM-ID-Name:Value The GUID value is generated and provided by the MDM server, not by Cisco ISE. Not applicable. Macaddresses Supported from MDM API Version 3 Not a Dictionary attribute None The list of MAC addresses that the UEM or MDM server has recorded for a particular device. A maximum of five MAC addresses can be shared for a device. The Macaddresses values are generated and provided by the MDM server, not by Cisco ISE. Not applicable. If a vendor's unique attributes are not supported, you may be able to use ERS APIs to exchange vendor-specific attributes. Check the vendor's documentation for information on the ERS APIs that are supported. The new MDM dictionary attributes are available for use in authorization policies. The following table lists the ports that must be open between Cisco ISE and an MDM server to enable them to communicate with each other. See the documentation from the MDM vendor for a list of ports that must be open on the MDM agent and server. Table 16. Ports Used by the MDM Server MDM Server Ports MobileIron 443 Zenprise 443 Good 19005 Airwatch 443 Afaria 443 Fiberlink MaaS 443 Meraki 443 Microsoft Intune 80 and 443 Microsoft SCCM 80 and 443 The user associates a device with an SSID. Cisco ISE makes an API call to the MDM server. This API call returns a list of devices for the user and the posture statuses for the devices. Note The input parameter is the MAC address of the endpoint device. For off-premise Apple iOS devices (any device that connects to Cisco ISE through a VPN), the input parameter is the UDID. If the user's device is not on this list, it means that the device is not registered. Cisco ISE sends an authorization request to the NAD to redirect to Cisco ISE. The user is presented with the MDM server page. Note You must register a device that is enrolled on the MDM server outside of a Cisco ISE network via the MDM portal. This is applicable for Cisco ISE Release 1.4 and later. Earlier Cisco ISE versions allow devices that are enrolled outside the Cisco ISE-enabled network to be automatically enrolled if they are compliant with the posture policies. Cisco ISE uses MDM to provision the device and presents the appropriate window for the user to register the device. The user registers the device in the MDM server, and the MDM server redirects the request to Cisco ISE through automatic redirection or manual browser refresh. Cisco ISE queries the MDM server again for the posture status. If the user's device is not compliant with the posture (compliance) policies that are configured on the MDM server, the user is notified that the device is out of compliance. The user must take the necessary action to ensure that the device is compliant. When the user's device is compliant, the MDM server updates the device's state in its internal tables. If the user refreshes the browser now, the control is transferred back to Cisco ISE. Cisco ISE polls the MDM server once every four hours to get compliance information and issues the appropriate Change of Authorization (CoA). You can configure the polling interval. Cisco ISE also checks the MDM server every five minutes to make sure that it is available. The following figure illustrates the MDM process flow. Note A device can only be enrolled in a single MDM server at a time. If you want to enroll the same device to an MDM service from another vendor, the previous vendor's profiles must be removed from the device. The MDM service usually offers a "corporate wipe", which only deletes the vendor's configuration from the device (not the whole device). The user can also remove the files. For example, on an iOS device, the user can go to the Settings > General >Device management window, and click Remove Management. Or the user can go to the MyDevices portal in Cisco ISE and click Corporate Wipe. Configure Cisco ISE to identify endpoints that are connected to an MDM server by a unique device identifier instead of a MAC address, to avoid issues caused by the use of random and changing MAC addresses. As a privacy measure, mobile devices increasingly use random and changing MAC addresses for each SSID that they connect to. Some desktop operating systems offer users the ability to randomize MAC addresses at regular intervals as well. This means that an endpoint presents different MAC addresses to the MDM server and Cisco ISE. As a result, when the MDM server and Cisco ISE are integrated and an action is initiated for an endpoint, issues arise because of the difference in the endpoint identity in the two systems. To work around this issue, you can configure Cisco ISE to use a unique device identifier instead of MAC addresses. When an endpoint enrolls with an MDM server, the MDM server sends a certificate with a GUID value to the endpoint. The endpoint uses this certificate for authentication with Cisco ISE. Cisco ISE receives the GUID for the endpoint from the certificate. All communications between Cisco ISE and the MDM server now use the GUID to identify the endpoint, ensuring accuracy and consistency between the two systems. Note that GUID is available only in certificate-based authentication methods. You must configure the certificates issued by the MDM or UEM server to include the GUID in the SAN URI or CN fields. We recommend configuring the SAN URI field for GUID. If the same certificate is used to authenticate an endpoint connected to Active Directory, the presence of GUID in the CN field might cause issues. Basic authentication methods that only use username and password will not be able to leverage the GUID-based solution. The Cisco ISE MDM APIs have been updated (Cisco ISE MDM APIs Version 3) to facilitate the gathering and management of GUID data. To check if an MDM server you have already connected to Cisco ISE supports the latest Cisco ISE MDM APIs and can send GUID information, carry out the following steps: In the Cisco ISE GUI, click the Menu icon () and choose . In the MDM Servers window, check the check box for the MDM server you want to update, and click Edit. Click Test Connection. If the MDM server supports Cisco ISE MDM APIs Version 3, a new section called Device Identifiers is displayed. Check the check boxes for one or more of the following options you want to enable: Cert - SAN URI, GUID Cert - CN, GUID Legacy MAC Address You can drag and drop the options to organize them in the order of preference. For example, if you place Cert - SAN URI, GUID first and then Cert - CN, GUID, Cisco ISE will first query the MDM server for the SAN URI and GUID attributes of an endpoint. If the requested attributes are not available, Cisco ISE will query for the CN and GUID attributes of the endpoint. Click Save. Cisco ISE can share this GUID information through the pxGrid with other Cisco solutions. For example, you can share the GUID received from MDM servers with a Cisco DNA Center in your deployment through pxGrid topics.

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