imprivata®

Product Documentation

Failover and Disaster Recovery

Imprivata OneSign® 23.2
Imprivata Confirm ID™ 23.2

Failover and Disaster Recovery

This document offers guidance on how to organize your Imprivata appliances and the computers they serve to optimize redundancy, successful failover, and uninterrupted service to users.

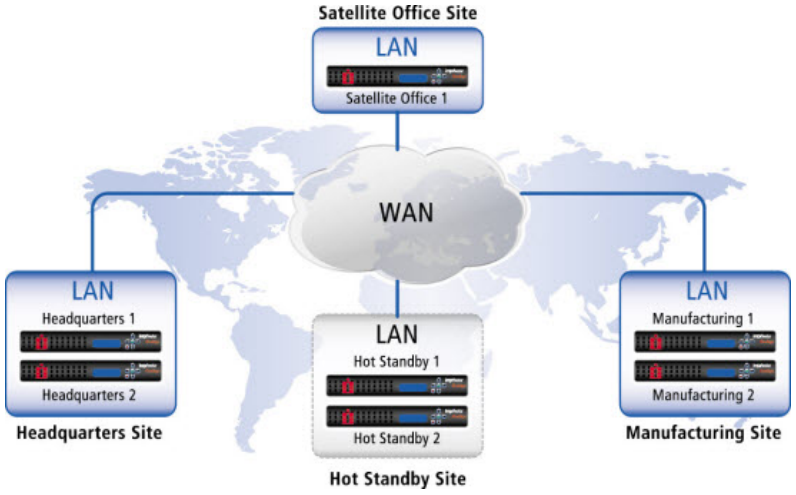
Imprivata Sites for G3 Enterprises

In a G3 (third generation) Imprivata enterprise, appliances and the computers they serve are grouped into Imprivata sites for administration of security, compliance reporting, and service availability.

Availability requirements have a significant impact on the number of appliances to configure in each G3 site. Within each site, consider configuring additional appliances than required to serve endpoint computers in that site, to accommodate for an appliance failure with zero interruption or degradation of service. User sessions are replicated among the appliances within a site; if an appliance fails the Imprivata agents migrate seamlessly to another appliance in the site. This behavior is configurable from the Imprivata Admin Console. Users are not required to log in again.

Appliances in multiple sites can provide fault tolerance by serving as backup to one another. The Imprivata database, including user enrollments, policies, and single sign-on services, is constantly synchronized among all Imprivata appliances at all sites in a G3 enterprise. If all appliances in a site are inaccessible, Imprivata agents can communicate with appliances in other sites (as configured by the administrator) and the switchover occurs automatically, although users may need to reauthenticate to Imprivata. When planning for failover capacity, remember to allocate enough appliances in each failover site to provide acceptable levels of service for both original and failed-over users.

An Imprivata enterprise can include any number of Imprivata sites. Imprivata G3 sites normally map to LANs within the enterprise. The following illustration shows a sample Imprivata G3 enterprise.



Appliances in a G3 site typically serve endpoint computers located in a geographical area served by a data center.

The **Sites** page in the Imprivata Admin Console (**gear** icon > **Sites** option) lists the sites and some information about the appliances in the sites. To review the details of a site, click on the site name on the **Sites** page to open the Imprivata site record. The contents of an Imprivata site record are detailed in topic "Configuring Imprivata Sites" in the Imprivata online help.

NOTE: To rename a site, go to the Imprivata Appliance Console **Enterprise** page, click the site you want to rename, change the name, and click **OK**. The change takes a few minutes to propagate throughout the enterprise.

Imprivata Sites for G4 Enterprises

Imprivata appliances and the endpoint computers they serve are grouped into Imprivata sites differently in a G4 (fourth-generation) Imprivata enterprise than in a G3 (third-generation) enterprise. In a G4 enterprise, only one or two sites are used, and Imprivata recommends a maximum of two sites. Although a G4 enterprise can include any number of sites, **having more than two sites no longer serves any purpose**. Imprivata G4 sites can cover WANs spanning geographic continents. For appliances in the one or two sites in a G4 enterprise, you can choose large enough disk and RAM sizes, and add service appliances to a data center if needed, to provide efficient authorization service to all users in a large organization. For more information on G4 appliance sizing and numbers, see "Number of Appliances to Deploy" in topic "System Requirements and Appliance Guidance" in the Imprivata online help.

Also, appliances in a G4 enterprise can fail over to each other without requiring additional sites. This is described below in Imprivata Agent Failover and Fault Tolerance.

A G4 enterprise typically contains one database appliance in each of two geographically distant data centers, and zero to four service appliances total in those same or nearby data centers, depending on capacity needs. **Imprivata strongly recommends that the two database appliances in a G4 enterprise be deployed to different data centers, preferably in different geographic regions or locations.** That way if one data center loses power or becomes unreachable, the other data center can service all endpoints in the enterprise.

Typical G4 enterprise site configurations are:

- **A single site with an "active/active" setup:** All appliances service endpoint agent authorization requests. The site has the recommended two database appliances for redundancy. This single-site setup works whether or not data centers are geographically dispersed. However, having dispersed data centers and having the two database appliances in different geographic regions provides greater resilience.
- **Two sites with an "active/active" setup:** All appliances in each site service endpoint agent authorization requests for that site. The enterprise has the recommended two database appliances, one in each site, for redundancy. Each site is assigned as the failover for the other site.

G4 enterprises avoid the resources and cost of a hot standby site: In a G4 enterprise, an active/active setup with enough appliances of sufficient capacity can handle data center failover and provide efficient authorization service to all enterprise users, without needing the extra resources and cost of a hot standby site. In a sample hot standby "active/passive" setup, pairs of one database appliance and one service appliance are deployed in each of two sites. At one site, both appliances service all endpoints, and the other site acts as a hot standby site for disaster recovery. Imprivata supports this active/passive setup, **but it is not optimal for G4 enterprises**. The hot standby site appliances are not used to service authorization requests, which places a greater service burden on actively used appliances. In particular, the second database appliance in a G4 enterprise has resource capacity that is too valuable to sit effectively idle.

In an enterprise with two database appliances, if one database fails or becomes unreachable, agents automatically redirect to the remaining database. If a database appliance goes down or becomes unreachable

for the indefinite future, for example due to a natural disaster, immediately add a replacement database appliance to the surviving site or data center.

Availability requirements have a significant impact on the number and capacity of appliances to configure in a G4 site and enterprise. Consider configuring more appliances or larger capacity appliances than are required to serve endpoint computers in a site and enterprise, to accommodate for an appliance failure with zero interruption or degradation of service.

User sessions are replicated among the database appliances in a G4 enterprise, regardless of their site. If an appliance fails, the Imprivata agents redirect seamlessly to another appliance in the site. This behavior is configurable from the Imprivata Admin Console. Users are not required to log in again after the redirection.

Appliances in two sites can provide fault tolerance by serving as backup to one another. The Imprivata database, including user enrollments, policies, and single sign-on services, is constantly synchronized between the two database appliances, independent of site, in a G4 enterprise. If all appliances in a site become inaccessible, Imprivata agents can communicate with appliances in the other site (as configured by the administrator) and the failover occurs automatically, although users may need to reauthenticate to Imprivata. When planning for failover capacity, allocate enough appliances with sufficient capacity in each failover site/location to provide acceptable levels of service for both original and failed-over users.

The **Sites** page in the Imprivata Admin Console (**gear** icon > **Sites** option) lists the sites and some information about the appliances in the sites. To review the details of a site, click on the site name on the **Sites** page to open the Imprivata site record. The contents of an Imprivata site record are detailed in topic "Configuring Imprivata Sites" in the Imprivata online help.

NOTE: To rename a site, go to the Imprivata Appliance Console**Enterprise** page, click the site you want to rename, change the name, and click **OK**. The change takes a few minutes to propagate throughout the enterprise.

Types of Sites

There are two types of Imprivata sites:

- **Active sites** — Handle daily Imprivata service for all agents on computers within their IP range.
- **Hot standby sites** — Stand idle until an active site fails over to the hot standby. A hot standby site is always current with the latest Imprivata data.

Active sites can fail over to each other. An Imprivata enterprise is not required to include any hot standby sites. **G4 enterprises do not need hot standby sites, which are not optimal for G4 enterprises,** as described in the previous section.

How Imprivata Agents Determine the Home Site

Each agent determines its home site based on the host computer's IP configuration. Each active site has a list of IP address ranges for subnets belonging to this site. The list of IP address ranges must be set up by the Imprivata administrator.

Imprivata matches the agent host's IP address against any range in any site. If a range is found then the site owning this range is considered to be the home site for the agent.

If this direct IP matching fails, the agent analyzes the routing table on the computer. The route lookup attempts to identify a route that covers any IP range for any site. Route lookup helps to determine the location for a VPN client outside the corporate network when direct IP address matching does not work.

IP ranges help determine the preferred site to use, rather than restrict access. If there is a non-default route to the host network, Imprivata route rules will choose the first of several sites with restrictive IP ranges within the corporate network sub-net.

External Servers

Imprivata connects to external servers such as domain controllers and ID token servers. You can assign specific external servers to any Imprivata site, overriding the enterprise setting.

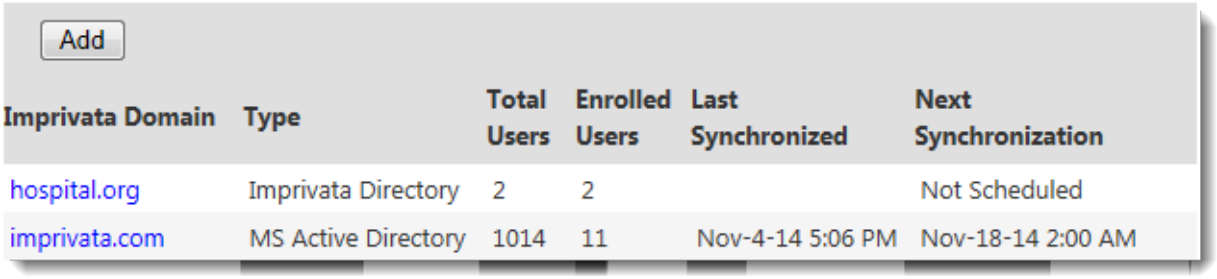
If you want to point different Imprivata appliances to unique external servers, you must define separate sites. For example, if you have one domain controller in London and one in New York, you could create two Imprivata sites and point each one to the relevant domain controller.

Connecting to a Domain

Each site can communicate with any external server reachable on the network, but sites usually connect to local directory servers (domain controllers).

User account information from each directory is replicated across all appliances in the site and across the enterprise, so there is no need to connect to user directories that are local to other Imprivata sites.

To view a list of domains and connections, go to the **Users** menu > **Directories** page in the Imprivata Admin Console:



From the **Directories** page, you can specify the host name of a user directory server for each domain.

Connecting to an External Token Server

Imprivata supports ID token authentication with VASCO OTP tokens and RSA SecurID tokens.

- VASCO OTP tokens are best managed through the Integrated VASCO OTP Tokens Authentication option, which provides an internal VASCO VACMAN server built into Imprivata.
- RSA SecurID tokens and Secure Computing SafeWord tokens require a connection to an external ID token server.

ID token server connections are available to all Imprivata sites.

You can deploy only one type of external ID token server in an enterprise, but this limit does not affect the Integrated VASCO OTP Tokens Authentication option. This makes it easy to migrate from one ID token type to another.

How the Imprivata Agent Selects the Appliance

Imprivata agents have a built-in mechanism for selecting an appliance. This section describes the rules by which an agent selects an appliance.

Agent starts for the first time —The agent retrieves the Imprivata enterprise topology: the full configuration of appliance and sites. The appliance specified by the IPTXPrimServer registry setting is used as the bootstrapping appliance for this purpose. After the topology is downloaded, rules in the topology are used to find the server to be used in communication. If the enterprise topology changes, the new topology is pushed to all Imprivata agents in the next update from the appliance. The new topology will then be evaluated when a new session is started, or on failover.

Subsequent agent connections — The agent first attempts to connect to a random appliance in its home site. It continues to use this appliance for new user sessions for a period of three hours. After three hours, the agent will attempt to connect to a different random server within its home site, for load balancing. If no other server is available, it will use the same server. This only applies to new sessions. It does not affect active running sessions — they will remain served by the same appliance. Active sessions are also not affected by any changes in the enterprise topology, as long as their appliance is still available.

If an agent cannot communicate with any appliance in its home site, it will try to fail over to a random appliance in another site — first the primary, then the secondary failover sites as specified by the Administrator. (Secondary failover sites typically are not used in a G4 enterprise, for which Imprivata recommends having at most two sites.) If an agent cannot find any appliance to connect to, it will attempt to connect to the IPTXPrimServer appliance — the "last resort" appliance. This allows recovery from situations when the topology is mis-configured and the agent cannot connect to any server.

An agent that cannot communicate with an appliance goes into offline mode. Further attempts to communicate with servers are done in the background, according to the interval set by the Administrator.

Agents come back online when they successfully connect through the process described above — on each authentication attempt the agent tries all of these strategies. This accommodates for changes in routing table configurations.

Imprivata Agent Failover and Fault Tolerance

For fault tolerance within a site that has multiple appliances, Imprivata can accommodate a failure of an appliance with no interruption or degradation of service. Deploying additional appliances at a site can provide higher levels of availability. Failover within a site is described in Agent Connection/Failover within a Site.

Appliances in multiple sites in a G3 enterprise, or in typically at most two sites in a G4 enterprise, can provide fault tolerance by serving as backups to one another across sites over a WAN. User enrollments, policies, and

SSO data are constantly synchronized among sites in a G3 enterprise, or among database appliances (independent of sites) in a G4 enterprise.

If all appliances in a site are inaccessible, Imprivata agents can communicate with appliances in other sites and the switchover occurs automatically. If an entire site is down, agents can be served by appliances at another site. Failover between sites is detailed in Agent Failover Between Sites.

View and Configure Site Topology

On the Imprivata Admin Console, go to the gear icon menu > **Sites** page to view your site topology. Imprivata sites service computers with IP addresses within a range set in the site record accessible on the **Sites** page. For details see topic "Configuring Imprivata Sites" in the Imprivata online help.

Imprivata Agent Failover

If all servers in the home site become unavailable, then agents switch to using a failover site (if specified). After a failover has been completed, the session preserves the connection to the appliance in the failover site for the duration of the session lifetime.

After appliances in the home site become available again, new sessions authenticated on computers that belong to this site start connecting to the home site again. However, active sessions do not automatically switch back. To force active sessions to reconnect to their agent home sites, users must lock and unlock their session, or log out and log back in.

Designating Primary and Secondary Failover Sites

For each site in your Imprivata enterprise, you can designate:

- a primary failover site and a secondary failover site
- a primary failover site but not a secondary failover site
- no failover sites

> **NOTE:** For G4 (fourth generation) enterprises, more than two sites are not needed, so secondary failover sites are also not needed, as explained in Imprivata Sites for G4 Enterprises. Therefore, for G4 enterprises with two sites, you typically specify a only primary failover site, and for G4 enterprises with only one site, you specify no failover sites.

Go to the **Sites** page in the Imprivata Admin Console (**gear** icon > **Sites**) and click on the site name to open the site record, where you can set the site's failover sites.

You do not specify failover rules at an appliance level. Imprivata agents automatically fail over to appliances within the same site first, and only if unable to connect to any appliance in the same site, then fail over to an appliance within any failover sites specified.

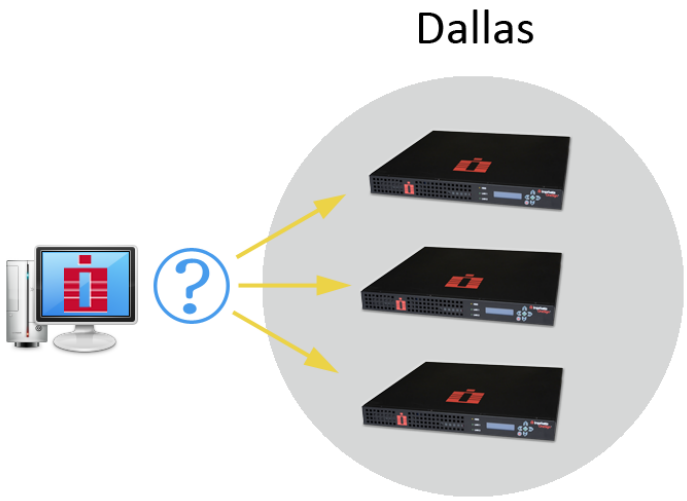
Users may have to reauthenticate when failing over to an appliance in another site. The user experience depends on how the user policy is configured for challenges when the Imprivata agent transitions from offline mode to online mode:

- If a challenge is always required, users must reauthenticate when failing over to an appliance in another site.
- If a challenge is not required within the specified grace period, and the grace period has not expired, users do not have to reauthenticate when failing over to an appliance in another site.

> **NOTE**: For complete details, see "Challenging Users Coming Online" in the Imprivata online help.

Agent Connection/Failover within a Site

Each Imprivata site includes a range of IP addresses for the computers that it services. Computers within that range always connect to the appliances in that site as long as any appliance within that site is active.



Connection and failover are random.

- When an Imprivata agent comes online, it connects randomly to any appliance within that site.
- If a connection cannot be made to the selected appliance, or if an appliance fails in a site that includes multiple appliances, then the agent fails over randomly to other appliances within that site. Failover is seamless to the user. No agent switches to another appliance during an active session unless it loses the connection to its assigned appliance.

For both connection and failover connection, there is no difference if an appliance is an audit appliance or not in a G3 (third generation) Imprivata enterprise, or if an appliance is a database appliance or service appliance in a G4 (fourth generation) enterprise. Agents connect equally to audit appliances and non-audit appliances in a G3 enterprise, and to database appliances and service appliances in a G4 enterprise.

Agent Failover Between Sites

If all appliances in a site fail, then agents in that site fail over to the designated failover site. The following table represents a potential agent connectivity/failure in a distributed environment for a G3 enterprise that includes a disaster recovery (DR) site.

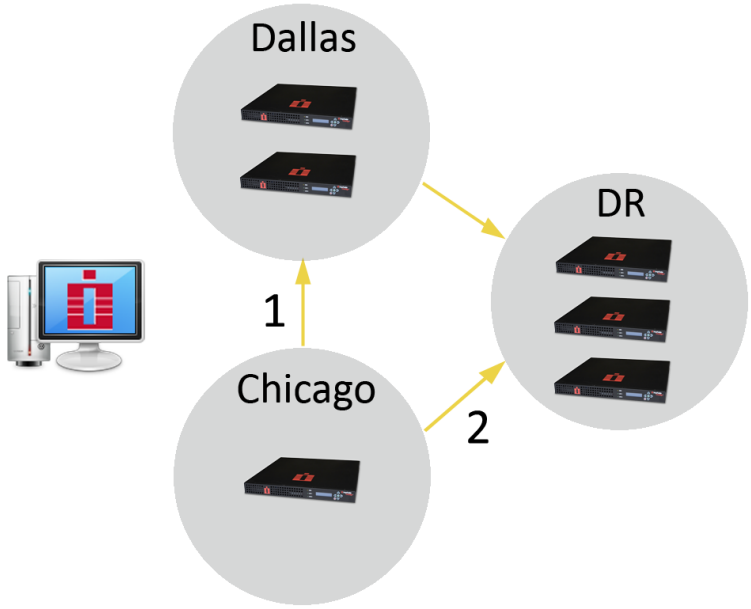
Site Name	IP Address Ranges	Appliances	Failover Rules
Dallas	172.16.8.0-172.16.10.255	dal1.yourco.com dal2.yourco.com	Primary-DR Secondary-None
Chicago	172.16.11.0-172.16.11.127 172.16.12.0-172.16.12.255	chi1.yourco.com	Primary-Dallas Secondary-DR
DR	0.0.0.0-0.0.0.0	dr1.yourco.com dr2.yourco.com dr2.yourco.com	Primary-None Secondary-None

The following table represents a potential agent connectivity/failure in a distributed environment for a G4 enterprise. Disaster recovery (hot standby) sites are not needed and are not optimal for G4 enterprises, as explained in "Imprivata Sites for G4 Enterprises" in the Imprivata OneSign online help, so that site is omitted.

Site Name	IP Address Ranges	Appliances	Failover Rules
Dallas	172.16.8.0-172.16.10.255	dal1.yourco.com dal2.yourco.com	Primary-Chicago Secondary-None
Chicago	172.16.11.0-172.16.11.127 172.16.12.0-172.16.12.255	chi1.yourco.com	Primary-Dallas Secondary-None

Agent Secondary Failover

Secondary failover settings increase robustness for a G3 enterprise by providing an alternative failover site in case the primary failover site cannot be reached. The following image represents a potential agent connectivity/failure in a distributed environment for a G3 enterprise.

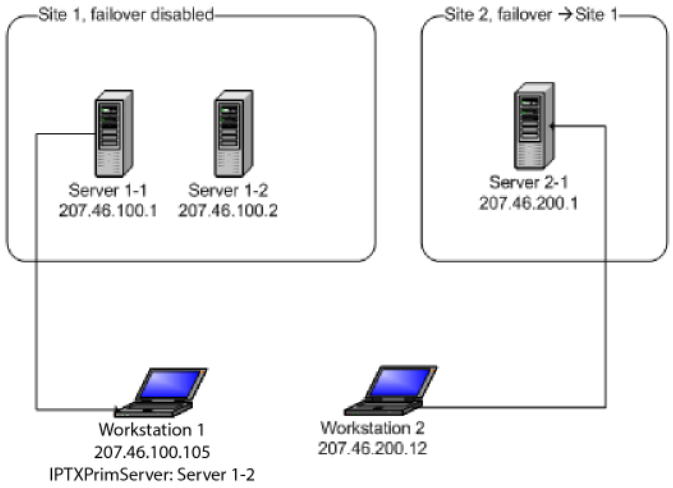


For G4 enterprises, secondary failover sites are not needed, as described above in Designating Primary and Secondary Failover Sites.

Agent Connection Examples

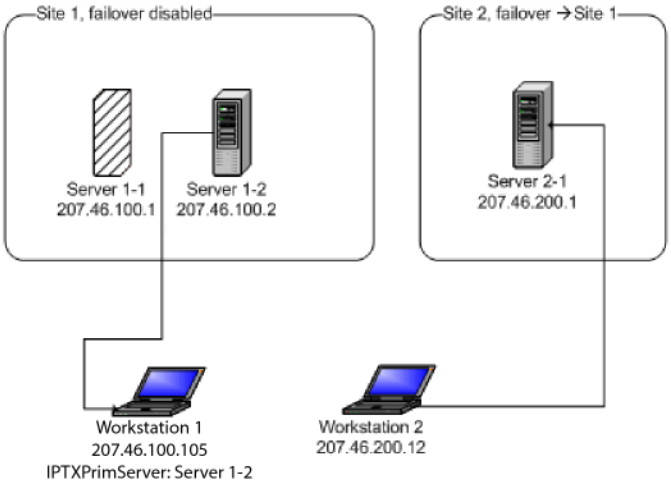
Example 1

Workstation 1 (207.46.100.105) will establish a connection with Site 1 (randomly selecting one of the servers) while Workstation 2 (207.46.200.12) will connect to Site 2 according to IP addresses assigned to the workstation.



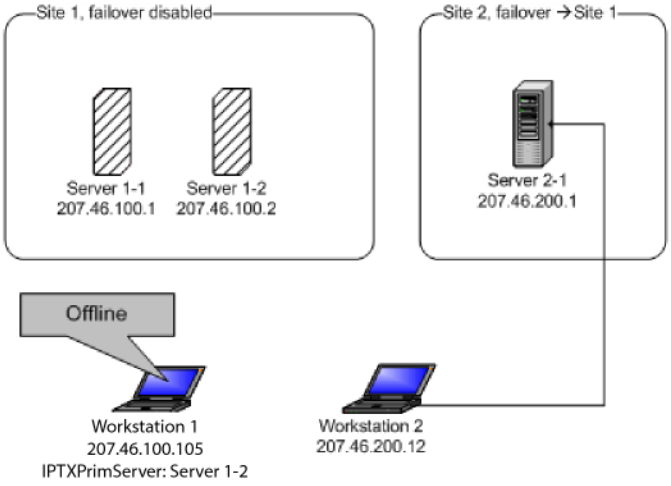
Site Name	IP Address Ranges	Appliances	Failover Rules
Site 1	207.46.100.1 – 207.46.100.255	Server 1-1: 207.46.100.1 Server 1-2: 207.46.100.2	Failover Disabled
Site 2	207.46.200.1 – 207.46.200.255	Server 2-1: 207.46.200.1	Primary Failover to Site 1 No Secondary Failover Site

If Server 1-1 becomes unavailable, the agent on Workstation 1 will switch to the other server in Site 1.

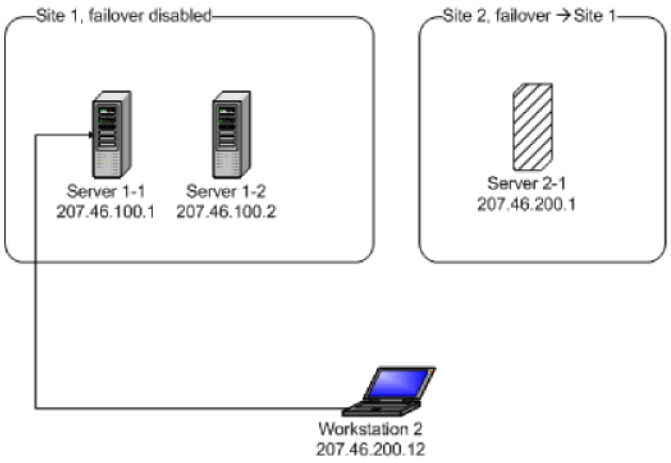


If Server 1-2 goes down as well, the agent goes offline, because:

- there are no failover sites defined for Site 1, and
- the agent's IPTXPrimServer server and Server 1-2 are in fact the same appliance, and
- the agent already tried to connect to it once.



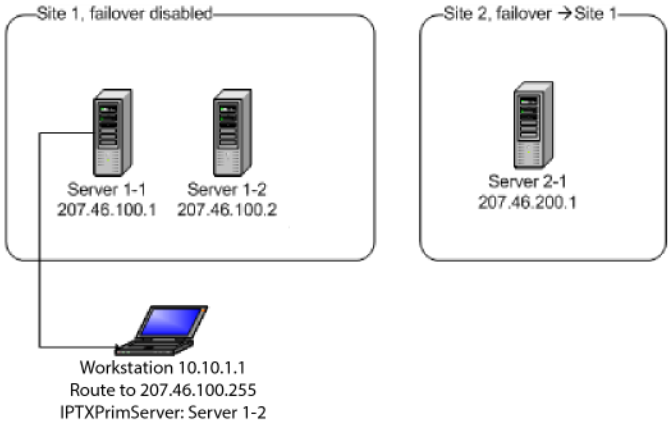
If all servers are up again, and Workstation 2 is connected to Server 2-1. If Server 2-1 goes offline, a failover occurs to one of the servers in Site 1: Site 1 is designated as the failover site for Site 2.



After Server 2-1 becomes available again, the existing session on Workstation 2 does not immediately fail back. Once the user locks and unlocks, or logs out and logs back in, a new connection is established within Site 2, as it is the home site for Workstation 2.

Example 2

Although the workstation's IP address (10.10.1.1) does not fall into the ranges of any of the sites, the route table contains a non-default route to 207.46.100.255: that covers the IP range for Site 1. Site 1 is considered to be the home site.

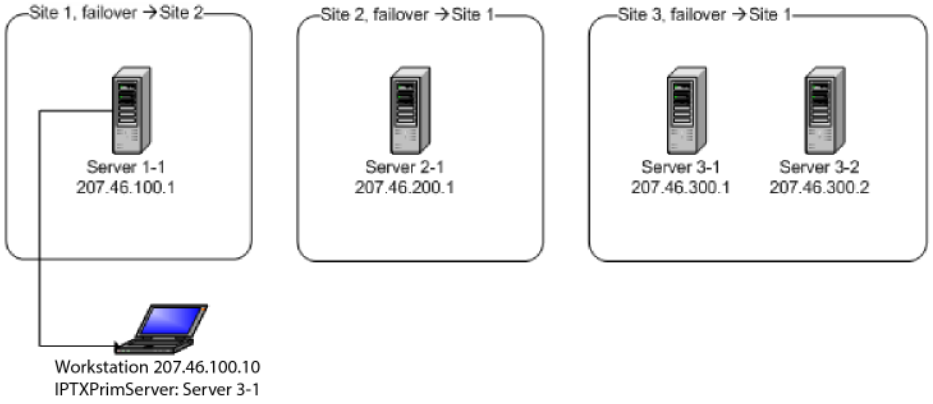


Site Name	IP Address Ranges	Appliances	Failover Rules
Site 1	207.46.100.1 – 207.46.100.255	Server 1-1: 207.46.100.1 Server 1-2: 207.46.100.2	Failover Disabled
Site 2	207.46.200.1 – 207.46.200.255	Server 2-1: 207.46.200.1	Failover to Site 1

Example 3

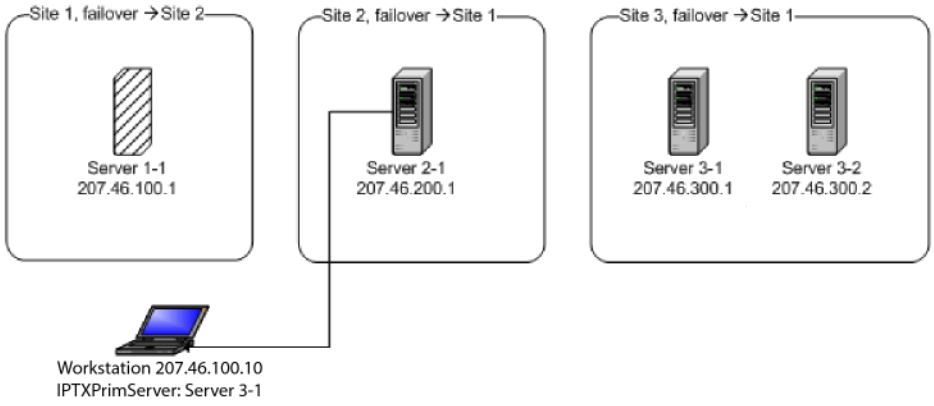
NOTE: This example applies mainly to G3 enterprises. Although it can also apply to G4 enterprises, the use of more than two sites for a G4 enterprise is not needed, as described in Imprivata Sites for G4 Enterprises.

If the single server in Site 1 is available, the agent will establish a connection to this site.

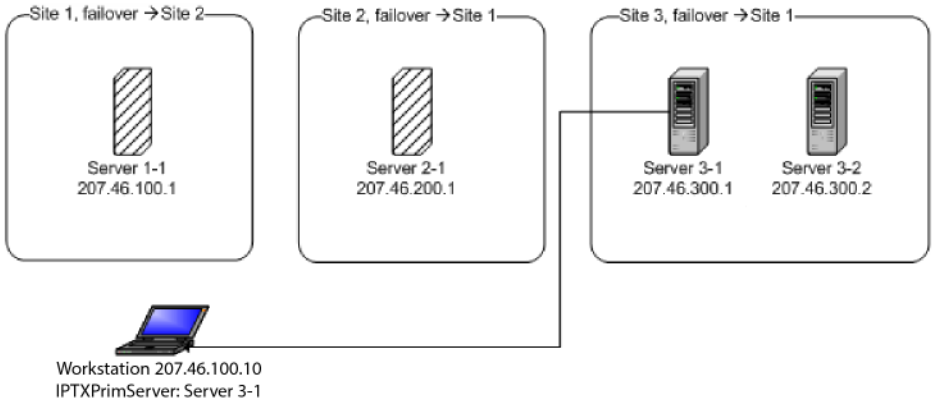


Site Name	IP Address Ranges	Appliances	Failover Rules
Site 1	207.46.100.1 – 207.46.100.255	Server 1-1: 207.46.100.1	Failover to Site 2
Site 2	207.46.200.1 – 207.46.200.255	Server 2-1: 207.46.200.1	Primary Failover to Site 1 No Secondary Failover Site
Site 3	207.46.300.1 – 207.46.300.255	Server 3-1: 207.46.300.1 Server 3-2: 207.46.300.2	Failover to Site 1

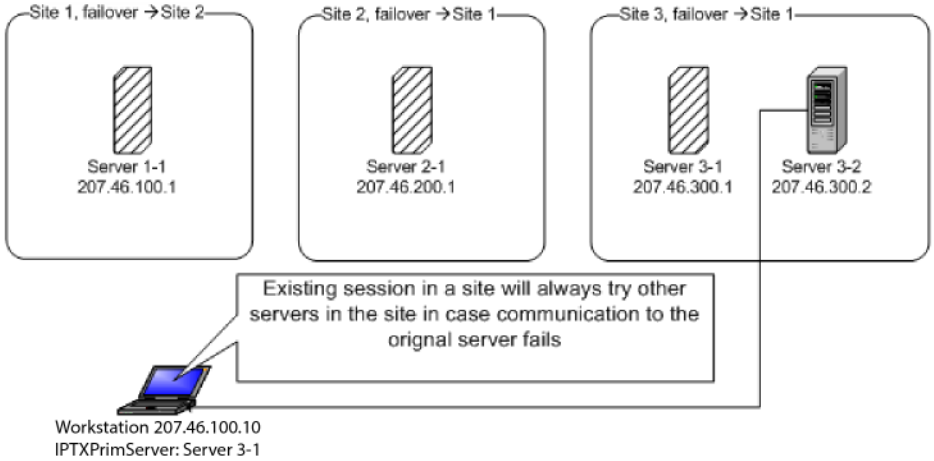
If Server 1-1 in Site 1 becomes unavailable, there are no available servers in the home site. In this case failover occurs and the agent tries to connect to a server in Site 2, which is designated the failover site for Site 1.



If Server 2-1 becomes unavailable as well, the final connection attempt is to this agent's designated IPTXPrimServer.

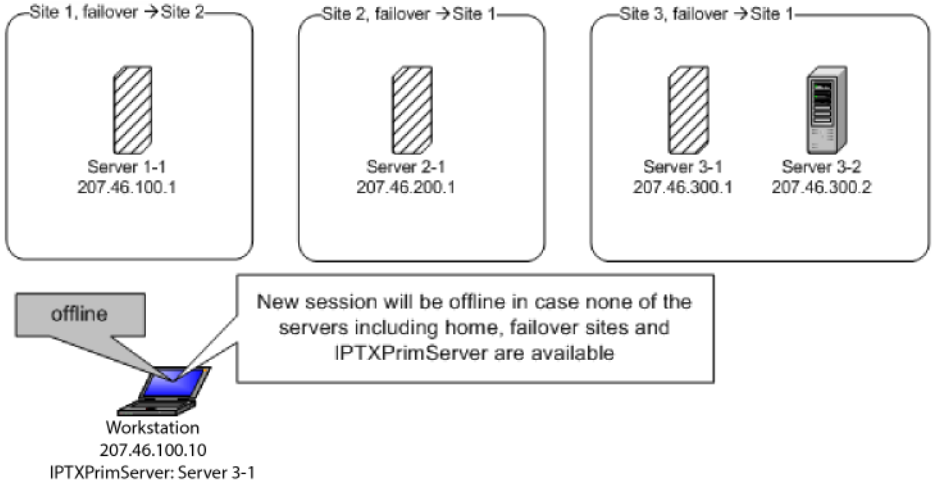


Failover site(s) for Site 2 (its only failover site is Site 1) are disregarded in this example, as the agent does not belong to Site 2 according to its IP configuration. If the final attempt to connect to its IPTXPrimServer succeeds, and the agent establishes a connection, the agent considers itself to be temporarily connected to a server in Site 3. If, for some server-related reason, the agent fails to send data to the original server in this site (Server 3-1), it attempts to switch to another server within Site 3. This is only valid for a failure that occurs on behalf of an existing session running on Server 3-1.



If a new session is about to be created, the agent effectively goes offline (or fails to authenticate if there is no offline authentication data), exhausting the connection choices in the following order:

- servers in home site;
- servers in failover site(s);
- the agent's designated IPTXPrimServer.



Imprivata Enterprise Operations

Operations Requiring All Appliances to Be Online

Some operations require that all appliances in the enterprise be up and running to ensure that changes are immediately propagated throughout the enterprise. These include:

- Adding a new appliance to the enterprise
- Removing one or more appliances from the enterprise. All **remaining** appliances, not to be removed, must be up. Therefore, if multiple appliances are down and need to be removed, they must be removed in one operation.

If an appliance is down while trying to perform these operations, you will need to remove it from the enterprise and then add it back when it becomes available.

Operations Requiring Downtime

When restoring a backup file, Imprivata OneSign is only stopped on the appliance from which the process is initiated. All other appliances remain online to maintain uninterrupted service. The server restarts automatically when the restore has finished.

During this time, the Imprivata Appliance Console remains available for all online appliances. However, the Imprivata Admin Console is unavailable.

Operations Not Requiring Downtime

Upgrading appliances does not require the Imprivata enterprise to go offline. For complete details of your Imprivata upgrade, see the Imprivata Upgrade Help.