Red Hat Satellite 6.15

Configuring Capsules with a load balancer

Distribute load among Capsules

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Distribute load among Capsules

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Abstract

This guide describes how to configure Red Hat Satellite to use a load balancer to distribute load among Capsule Servers.

Table of Contents

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Use the **Create Issue** form in Red Hat Jira to provide your feedback. The Jira issue is created in the Red Hat Satellite Jira project, where you can track its progress.

Prerequisites

- Ensure you have registered a Red Hat account.

Procedure

1. Click the following link: **Create Issue**. If Jira displays a login error, log in and proceed after you are redirected to the form.
2. Complete the **Summary** and **Description** fields. In the **Description** field, include the documentation URL, chapter or section number, and a detailed description of the issue. Do not modify any other fields in the form.
3. Click **Create**.

CHAPTER 1. LOAD BALANCING SOLUTION ARCHITECTURE

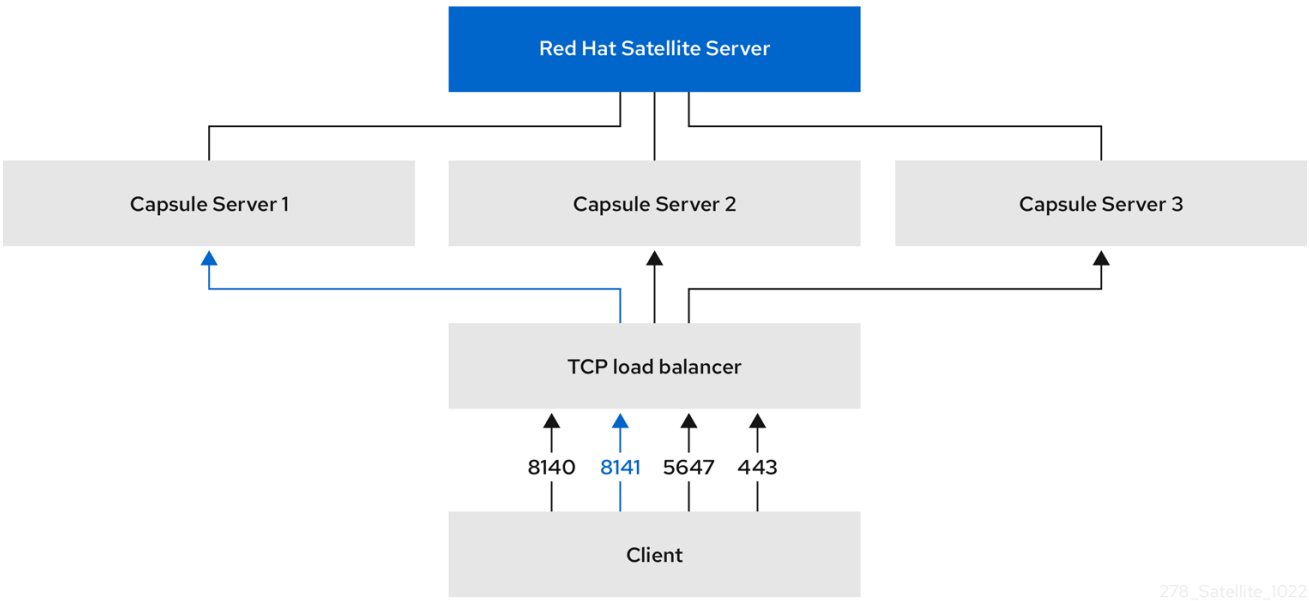
You can configure Satellite Server to use a load balancer to distribute client requests and network load across multiple Capsule Servers. This results in an overall performance improvement on Capsule Servers.

This guide outlines how to prepare Satellite Server and Capsule Server for load balancing, and provides guidelines on how to configure a load balancer and register clients in a load-balanced setup.

A load-balanced setup consists of the following components:

- Satellite Server
- Two or more Capsule Servers
- A load balancer
- Multiple clients

Figure 1.1. Satellite load balancing solution architecture



In a load-balanced setup, nearly all Capsule functionality continues to work as expected when one Capsule Server is down, for planned or unplanned maintenance. A load balancer works with the following services and features:

- Registration using **subscription-manager**
- Content management with Yum repositories
- Optional: Puppet

NOTE

In the load-balanced setup, a load balancer distributes load only for the services and features mentioned above. If other services, such as provisioning or virt-who, are running on the individual Capsules, you must access them directly through Capsules and not through the load balancer.

Managing Puppet limitations

Puppet Certificate Authority (CA) management does not support certificate signing in a load-balanced setup. Puppet CA stores certificate information, such as the serial number counter and CRL, on the file system. Multiple writer processes that attempt to use the same data can corrupt it.

To manage this Puppet limitation, complete the following steps:

1. Configure Puppet certificate signing on one Capsule Server, typically the first system where you configure Capsule Server for load balancing.

2. Configure the clients to send CA requests to port 8141 on a load balancer.

3. Configure a load balancer to redirect CA requests from port 8141 to port 8140 on the system where you configure Capsule Server to sign Puppet certificates.

CHAPTER 2. LOAD BALANCING CONSIDERATIONS

Distributing load between several Capsule Servers prevents any one Capsule from becoming a single point of failure. Configuring Capsules to use a load balancer can provide resilience against planned and unplanned outages. This improves availability and responsiveness.

Consider the following guidelines when configuring load balancing:

- If you use Puppet, Puppet certificate signing is assigned to the first Capsule that you configure. If the first Capsule is down, clients cannot obtain Puppet content.
- This solution does not use Pacemaker or other similar HA tools to maintain one state across all Capsules. To troubleshoot issues, reproduce the issue on each Capsule, bypassing the load balancer.

Additional maintenance required for load balancing

Configuring Capsules to use a load balancer results in a more complex environment and requires additional maintenance.

The following additional steps are required for load balancing:

- You must ensure that all Capsules have the same content views and synchronize all Capsules to the same content view versions
- You must upgrade each Capsule in sequence
- You must backup each Capsule that you configure regularly

Upgrading Capsule Servers in a load balancing configuration

To upgrade Capsule Servers from 6.14 to 6.15, complete the Upgrading Capsule Servers procedure in *Upgrading connected Red Hat Satellite to 6.15*. There are no additional steps required for Capsule Servers in a load balancing configuration.

CHAPTER 3. PREREQUISITES FOR CONFIGURING CAPSULE SERVERS FOR LOAD BALANCING

To configure Capsule Servers for load balancing, complete the following procedures described in *Installing Capsule Server*. Satellite does not support configuring existing Capsule Servers for load balancing.

1. Registering Capsule Server to Satellite Server
2. Attaching the Satellite Infrastructure Subscription
3. Configuring Repositories
4. Synchronizing the System Clock With chronyd
5. Installing Capsule Server Packages

CHAPTER 4. CONFIGURING CAPSULE SERVERS FOR LOAD BALANCING

This chapter outlines how to configure Capsule Servers for load balancing. Proceed to one of the following sections depending on your Satellite Server configuration:

- Section 4.1, “Configuring Capsule Server with default SSL certificates for load balancing without Puppet”
- Section 4.2, “Configuring Capsule Server with default SSL certificates for load balancing with Puppet”
- Section 4.3.2, “Configuring Capsule Server with custom SSL certificates for load balancing without Puppet”
- Section 4.4, “Configuring Capsule Server with custom SSL certificates for load balancing with Puppet”

Use different file names for the Katello certificates you create for each Capsule Server. For example, name the certificate archive file with Capsule Server FQDN.

4.1. CONFIGURING CAPSULE SERVER WITH DEFAULT SSL CERTIFICATES FOR LOAD BALANCING WITHOUT PUPPET

The following section describes how to configure Capsule Servers that use default SSL certificates for load balancing without Puppet. Complete this procedure on each Capsule Server that you want to configure for load balancing.

Procedure

1. On Satellite Server, generate Katello certificates for Capsule Server:

```
# capsule-certs-generate \
--certs-tar "/root/capsule.example.com-certs.tar" \
--foreman-proxy-cname loadbalancer.example.com \
--foreman-proxy-fqdn capsule.example.com
```

   Retain a copy of the example **satellite-installer** command that is output by the **capsule-certs-generate** command for installing Capsule Server certificate.

2. Copy the certificate archive file from Satellite Server to Capsule Server.

```
# scp /root/capsule.example.com-certs.tar
root@capsule.example.com:/root/capsule.example.com-certs.tar
```

3. Append the following options to the **satellite-installer** command that you obtain from the output of the **capsule-certs-generate** command:

```
--certs-cname "loadbalancer.example.com" \
--enable-foreman-proxy-plugin-remote-execution-script
```

4. On Capsule Server, enter the **satellite-installer** command:

```
# satellite-installer --scenario capsule \
--certs-cname "loadbalancer.example.com" \
--certs-tar-file "capsule.example.com-certs.tar" \
--enable-foreman-proxy-plugin-remote-execution-script \
--foreman-proxy-foreman-base-url "https://satellite.example.com" \
--foreman-proxy-oauth-consumer-key "oauth key" \
--foreman-proxy-oauth-consumer-secret "oauth secret" \
--foreman-proxy-register-in-foreman "true" \
--foreman-proxy-trusted-hosts "satellite.example.com" \
--foreman-proxy-trusted-hosts "capsule.example.com"
```

4.2. CONFIGURING CAPSULE SERVER WITH DEFAULT SSL CERTIFICATES FOR LOAD BALANCING WITH PUPPET

The following section describes how to configure Capsule Servers that use default SSL certificates for load balancing with Puppet.

If you use Puppet in your Satellite configuration, you must complete the following procedures:

1. Section 4.2.1, “Configuring Capsule Server with default SSL certificates to generate and sign Puppet certificates”
2. Section 4.2.2, “Configuring remaining Capsule Servers with default SSL certificates for load balancing”

4.2.1. Configuring Capsule Server with default SSL certificates to generate and sign Puppet certificates

Complete this procedure only for the system where you want to configure Capsule Server to generate and sign Puppet certificates for all other Capsule Servers that you configure for load balancing.

Procedure

1. On Satellite Server, generate Katello certificates for the system where you configure Capsule Server to generate and sign Puppet certificates:

```
# capsule-certs-generate \
--certs-tar "/root/capsule-ca.example.com-certs.tar" \
--foreman-proxy-cname loadbalancer.example.com \
--foreman-proxy-fqdn capsule-ca.example.com
```

   Retain a copy of the example **satellite-installer** command that is output by the **capsule-certs-generate** command for installing Capsule Server certificate.

2. Copy the certificate archive file from Satellite Server to Capsule Server:

```
# scp /root/capsule-ca.example.com-certs.tar root@capsule-ca.example.com:capsule-ca.example.com-certs.tar
```

3. Append the following options to the **satellite-installer** command that you obtain from the output of the **capsule-certs-generate** command:

```
--certs-cname "loadbalancer.example.com" \
```

```
--enable-foreman-proxy-plugin-remote-execution-script \
--foreman-proxy-puppetca "true" \
--puppet-ca-server "capsule-ca.example.com" \
--puppet-dns-alt-names "loadbalancer.example.com" \
--puppet-server-ca "true"
```

4. On Capsule Server, enter the **satellite-installer** command:

```
# satellite-installer --scenario capsule \
--certs-cname "loadbalancer.example.com" \
--certs-tar-file "capsule-ca.example.com-certs.tar" \
--enable-foreman-proxy-plugin-remote-execution-script \
--enable-puppet \
--foreman-proxy-foreman-base-url "https://satellite.example.com" \
--foreman-proxy-oauth-consumer-key "oauth key" \
--foreman-proxy-oauth-consumer-secret "oauth secret" \
--foreman-proxy-puppetca "true" \
--foreman-proxy-register-in-foreman "true" \
--foreman-proxy-trusted-hosts "satellite.example.com" \
--foreman-proxy-trusted-hosts "capsule-ca.example.com" \
--puppet-ca-server "capsule-ca.example.com" \
--puppet-dns-alt-names "loadbalancer.example.com" \
--puppet-server true \
--puppet-server-ca "true"
```

5. On Capsule Server, stop the Puppet server:

```
# puppet resource service puppetserver ensure=stopped
```

6. Generate Puppet certificates for all other Capsule Servers that you configure for load balancing, except the first system where you configure Puppet certificates signing:

```
# puppetserver ca generate \
--ca-client \
--certname capsule.example.com \
--subject-alt-names loadbalancer.example.com
```

This command creates the following files on the system where you configure Capsule Server to sign Puppet certificates:

- **/etc/puppetlabs/puppet/ssl/certs/*capsule.example.com*.pem**
- **/etc/puppetlabs/puppet/ssl/certs/ca.pem**
- **/etc/puppetlabs/puppet/ssl/private_keys/*capsule.example.com*.pem**
- **/etc/puppetlabs/puppet/ssl/public_keys/*capsule.example.com*.pem**

7. Resume the Puppet server:

```
# puppet resource service puppetserver ensure=running
```

4.2.2. Configuring remaining Capsule Servers with default SSL certificates for load balancing

Complete this procedure on each Capsule Server excluding the system where you configure Capsule Server to sign Puppet certificates.

Procedure

1. On Satellite Server, generate Katello certificates for Capsule Server:

```
# capsule-certs-generate \
--certs-tar "/root/capsule.example.com-certs.tar" \
--foreman-proxy-cname loadbalancer.example.com \
--foreman-proxy-fqdn capsule.example.com
```

   Retain a copy of the example **satellite-installer** command that is output by the **capsule-certs-generate** command for installing Capsule Server certificate.

2. Copy the certificate archive file from Satellite Server to Capsule Server:

```
# scp /root/capsule.example.com-certs.tar
root@capsule.example.com:/root/capsule.example.com-certs.tar
```

3. On Capsule Server, install the **puppetserver** package:

```
# satellite-maintain packages install puppetserver
```

4. On Capsule Server, create directories for puppet certificates:

```
# mkdir -p /etc/puppetlabs/puppet/ssl/certs/ \
/etc/puppetlabs/puppet/ssl/private_keys/ \
/etc/puppetlabs/puppet/ssl/public_keys/
```

5. On Capsule Server, copy the Puppet certificates for this Capsule Server from the system where you configure Capsule Server to sign Puppet certificates:

```
# scp root@capsule-ca.example.com:/etc/puppetlabs/puppet/ssl/certs/capsule.example.com.pem
/etc/puppetlabs/puppet/ssl/certs/capsule.example.com.pem
# scp root@capsule-ca.example.com:/etc/puppetlabs/puppet/ssl/certs/ca.pem
/etc/puppetlabs/puppet/ssl/certs/ca.pem
# scp root@capsule-ca.example.com:/etc/puppetlabs/puppet/ssl/private_keys/capsule.example.com.pem
/etc/puppetlabs/puppet/ssl/private_keys/capsule.example.com.pem
# scp root@capsule-ca.example.com:/etc/puppetlabs/puppet/ssl/public_keys/capsule.example.com.pem
/etc/puppetlabs/puppet/ssl/public_keys/capsule.example.com.pem
```

6. On Capsule Server, change the **/etc/puppetlabs/puppet/ssl/** directory ownership to user **puppet** and group **puppet**:

```
# chown -R puppet:puppet /etc/puppetlabs/puppet/ssl/
```

7. On Capsule Server, set the SELinux context for the **/etc/puppetlabs/puppet/ssl/** directory:

```
# restorecon -Rv /etc/puppetlabs/puppet/ssl/
```

8. Append the following options to the **satellite-installer** command that you obtain from the output of the **capsule-certs-generate** command:

```
--certs-cname "loadbalancer.example.com" \
--enable-foreman-proxy-plugin-remote-execution-script \
--foreman-proxy-puppetca "false" \
--puppet-ca-server "capsule-ca.example.com" \
--puppet-dns-alt-names "loadbalancer.example.com" \
--puppet-server-ca "false"
```

9. On Capsule Server, enter the **satellite-installer** command:

```
# satellite-installer --scenario capsule \
--certs-cname "loadbalancer.example.com" \
--certs-tar-file "capsule.example.com-certs.tar" \
--enable-foreman-proxy-plugin-remote-execution-script \
--foreman-proxy-foreman-base-url "https://satellite.example.com" \
--foreman-proxy-oauth-consumer-key "oauth key" \
--foreman-proxy-oauth-consumer-secret "oauth secret" \
--foreman-proxy-puppetca "false" \
--foreman-proxy-register-in-foreman "true" \
--foreman-proxy-trusted-hosts "satellite.example.com" \
--foreman-proxy-trusted-hosts "capsule.example.com" \
--puppet-ca-server "capsule-ca.example.com" \
--puppet-dns-alt-names "loadbalancer.example.com" \
--puppet-server-ca "false"
```

4.3. CONFIGURING CAPSULE SERVER WITH CUSTOM SSL CERTIFICATES FOR LOAD BALANCING WITHOUT PUPPET

The following section describes how to configure Capsule Servers that use custom SSL certificates for load balancing without Puppet.

4.3.1. Creating a custom SSL certificate for Capsule Server

This procedure outlines how to create a configuration file for the Certificate Signing Request and include the load balancer and Capsule Server as Subject Alternative Names (SAN). Complete this procedure on each Capsule Server that you want to configure for load balancing.

Procedure

1. To store all the source certificate files, create a directory that is accessible only to the **root** user:

```
# mkdir /root/capsule_cert
```

2. Create a private key with which to sign the certificate signing request (CSR).
Note that the private key must be unencrypted. If you use a password-protected private key, remove the private key password.

   If you already have a private key for this Capsule Server, skip this step.

```
# openssl genrsa -out /root/capsule_cert/capsule_cert_key.pem 4096
```

3. Create the **/root/capsule_cert/openssl.cnf** configuration file for the CSR and include the following content:

```
[ req ]
req_extensions = v3_req
distinguished_name = req_distinguished_name
x509_extensions = usr_cert
prompt = no

[ req_distinguished_name ]
commonName = capsule.example.com (1)

[ v3_req ]
basicConstraints = CA:FALSE
keyUsage = digitalSignature, nonRepudiation, keyEncipherment, dataEncipherment
extendedKeyUsage = serverAuth, clientAuth, codeSigning, emailProtection
subjectAltName = @alt_names

[alt_names] (2)
DNS.1 = loadbalancer.example.com
DNS.2 = capsule.example.com
```

(1) The certificate's common name must match the FQDN of Capsule Server. Ensure to change this when running the command on each Capsule Server that you configure for load balancing. You can also set a wildcard value *****. If you set a wildcard value, you must add the **-t capsule** option when you use the **katello-certs-check** command.

(2) Under **[alt_names]**, include the FQDN of the load balancer as **DNS.1** and the FQDN of Capsule Server as **DNS.2**.

4. Optional: If you want to add Distinguished Name (DN) details to the CSR, add the following information to the **[req_distinguished_name]** section:

```
[req_distinguished_name]
CN = capsule.example.com
countryName =My_Country_Name (1)
stateOrProvinceName = My_State_Or_Province_Name (2)
localityName = My_Locality_Name (3)
organizationName = My_Organization_Or_Company_Name
organizationalUnitName = My_Organizational_Unit_Name (4)
```

(1) Two letter code

(2) Full name

(3) Full name (example: New York)

(4) Division responsible for the certificate (example: IT department)

5. Generate CSR:

```
# openssl req -new \
-key /root/capsule_cert/capsule_cert_key.pem \ (1)
```

```
-config /root/capsule_cert/openssl.cnf \ 2
-out /root/capsule_cert/capsule_cert_csr.pem 3
```

1. Path to the private key
2. Path to the configuration file
3. Path to the CSR to generate

6. Send the certificate signing request to the certificate authority (CA). The same CA must sign certificates for Satellite Server and Capsule Server.
   When you submit the request, specify the lifespan of the certificate. The method for sending the certificate request varies, so consult the CA for the preferred method. In response to the request, you can expect to receive a CA bundle and a signed certificate, in separate files.

7. Copy the Certificate Authority bundle and Capsule Server certificate file that you receive from the Certificate Authority, and Capsule Server private key to your Satellite Server.

8. On Satellite Server, validate Capsule Server certificate input files:

```
# katello-certs-check \
-c /root/capsule_cert/capsule_cert.pem \ 1
-k /root/capsule_cert/capsule_cert_key.pem \ 2
-b /root/capsule_cert/ca_cert_bundle.pem 3
```

1. Capsule Server certificate file, provided by your Certificate Authority
2. Capsule Server's private key that you used to sign the certificate
3. Certificate Authority bundle, provided by your Certificate Authority

If you set the **commonName=** to a wildcard value *, you must add the **-t capsule** option to the **katello-certs-check** command.

Retain a copy of the example **capsule-certs-generate** command that is output by the **katello-certs-check** command for creating the Certificate Archive File for this Capsule Server.

4.3.2. Configuring Capsule Server with custom SSL certificates for load balancing without Puppet

The following section describes how to configure Capsule Servers that use custom SSL certificates for load balancing without Puppet. Complete this procedure on each Capsule Server that you want to configure for load balancing.

Procedure

1. Append the following option to the **capsule-certs-generate** command that you obtain from the output of the **katello-certs-check** command:

```
--foreman-proxy-cname loadbalancer.example.com
```

2. On Satellite Server, enter the **capsule-certs-generate** command to generate Capsule certificates:

```
# capsule-certs-generate \
--certs-tar /root/capsule_cert/capsule.tar \
--foreman-proxy-cname loadbalancer.example.com \
--foreman-proxy-fqdn capsule.example.com \
--server-ca-cert /root/capsule_cert/ca_cert_bundle.pem \
--server-cert /root/capsule_cert/capsule.pem \
--server-key /root/capsule_cert/capsule.pem
```

Retain a copy of the example **satellite-installer** command from the output for installing Capsule Server certificates.

3. Copy the certificate archive file from Satellite Server to Capsule Server:

```
# scp /root/capsule.example.com-certs.tar
root@capsule.example.com:capsule.example.com-certs.tar
```

4. Append the following options to the **satellite-installer** command that you obtain from the output of the **capsule-certs-generate** command:

```
--certs-cname "loadbalancer.example.com" \
--enable-foreman-proxy-plugin-remote-execution-script
```

5. On Capsule Server, enter the **satellite-installer** command:

```
# satellite-installer --scenario capsule \
--certs-cname "loadbalancer.example.com" \
--certs-tar-file "capsule.example.com-certs.tar" \
--enable-foreman-proxy-plugin-remote-execution-script \
--foreman-proxy-foreman-base-url "https://satellite.example.com" \
--foreman-proxy-oauth-consumer-key "oauth key" \
--foreman-proxy-oauth-consumer-secret "oauth secret" \
--foreman-proxy-register-in-foreman "true" \
--foreman-proxy-trusted-hosts "satellite.example.com" \
--foreman-proxy-trusted-hosts "capsule.example.com"
```

4.4. CONFIGURING CAPSULE SERVER WITH CUSTOM SSL CERTIFICATES FOR LOAD BALANCING WITH PUPPET

If you use Puppet in your Satellite configuration, then you must complete the following procedures:

1. Section 4.4.2, “Configuring Capsule Server with custom SSL certificates to generate and sign Puppet certificates”
2. Section 4.4.3, “Configuring remaining Capsule Servers with custom SSL certificates for load balancing”

4.4.1. Creating a custom SSL certificate for Capsule Server

This procedure outlines how to create a configuration file for the Certificate Signing Request and include the load balancer and Capsule Server as Subject Alternative Names (SAN). Complete this procedure on each Capsule Server that you want to configure for load balancing.

Procedure

1. To store all the source certificate files, create a directory that is accessible only to the **root** user:

```
# mkdir /root/capsule_cert
```

2. Create a private key with which to sign the certificate signing request (CSR).
Note that the private key must be unencrypted. If you use a password-protected private key, remove the private key password.

   If you already have a private key for this Capsule Server, skip this step.

```
# openssl genrsa -out /root/capsule_cert/capsule_cert_key.pem 4096
```

3. Create the **/root/capsule_cert/openssl.cnf** configuration file for the CSR and include the following content:

```
[ req ]
req_extensions = v3_req
distinguished_name = req_distinguished_name
x509_extensions = usr_cert
prompt = no

[ req_distinguished_name ]
commonName = capsule.example.com 1

[ v3_req ]
basicConstraints = CA:FALSE
keyUsage = digitalSignature, nonRepudiation, keyEncipherment, dataEncipherment
extendedKeyUsage = serverAuth, clientAuth, codeSigning, emailProtection
subjectAltName = @alt_names

[alt_names] 2
DNS.1 = loadbalancer.example.com
DNS.2 = capsule.example.com
```

1 The certificate's common name must match the FQDN of Capsule Server. Ensure to change this when running the command on each Capsule Server that you configure for load balancing. You can also set a wildcard value *. If you set a wildcard value, you must add the **-t capsule** option when you use the **katello-certs-check** command.

2 Under **[alt_names]**, include the FQDN of the load balancer as **DNS.1** and the FQDN of Capsule Server as **DNS.2**.

4. Optional: If you want to add Distinguished Name (DN) details to the CSR, add the following information to the **[req_distinguished_name]** section:

```
[req_distinguished_name]
CN = capsule.example.com
countryName =My_Country_Name 1
stateOrProvinceName = My_State_Or_Province_Name 2
localityName = My_Locality_Name 3
organizationName = My_Organization_Or_Company_Name
organizationalUnitName = My_Organizational_Unit_Name 4
```

1. Two letter code
2. Full name
3. Full name (example: New York)
4. Division responsible for the certificate (example: IT department)

5. Generate CSR:

```
# openssl req -new \
-key /root/capsule_cert/capsule_cert_key.pem \ 1
-config /root/capsule_cert/openssl.cnf \ 2
-out /root/capsule_cert/capsule_cert_csr.pem 3
```

1. Path to the private key
2. Path to the configuration file
3. Path to the CSR to generate

6. Send the certificate signing request to the certificate authority (CA). The same CA must sign certificates for Satellite Server and Capsule Server.
When you submit the request, specify the lifespan of the certificate. The method for sending the certificate request varies, so consult the CA for the preferred method. In response to the request, you can expect to receive a CA bundle and a signed certificate, in separate files.

7. Copy the Certificate Authority bundle and Capsule Server certificate file that you receive from the Certificate Authority, and Capsule Server private key to your Satellite Server.

8. On Satellite Server, validate Capsule Server certificate input files:

```
# katello-certs-check \
-c /root/capsule_cert/capsule_cert.pem \ 1
-k /root/capsule_cert/capsule_cert_key.pem \ 2
-b /root/capsule_cert/ca_cert_bundle.pem 3
```

1. Capsule Server certificate file, provided by your Certificate Authority
2. Capsule Server's private key that you used to sign the certificate
3. Certificate Authority bundle, provided by your Certificate Authority

If you set the **commonName=** to a wildcard value ***, you must add the **-t capsule** option to the **katello-certs-check** command.

Retain a copy of the example **capsule-certs-generate** command that is output by the **katello-certs-check** command for creating the Certificate Archive File for this Capsule Server.

4.4.2. Configuring Capsule Server with custom SSL certificates to generate and sign Puppet certificates

Complete this procedure only for the system where you want to configure Capsule Server to generate Puppet certificates for all other Capsule Servers that you configure for load balancing.

Procedure

1. Append the following option to the **capsule-certs-generate** command that you obtain from the output of the **katello-certs-check** command:

```
--foreman-proxy-cname loadbalancer.example.com
```

2. On Satellite Server, enter the **capsule-certs-generate** command to generate Capsule certificates:

```
# capsule-certs-generate \
--certs-tar /root/capsule_cert/capsule-ca.tar \
--foreman-proxy-cname loadbalancer.example.com \
--foreman-proxy-fqdn capsule-ca.example.com \
--server-ca-cert /root/capsule_cert/ca_cert_bundle.pem \
--server-cert /root/capsule_cert/capsule-ca.pem \
--server-key /root/capsule_cert/capsule-ca.pem
```

   Retain a copy of the example **satellite-installer** command from the output for installing Capsule Server certificates.

3. Copy the certificate archive file from Satellite Server to Capsule Server.

4. Append the following options to the **satellite-installer** command that you obtain from the output of the **capsule-certs-generate** command:

```
--enable-foreman-proxy-plugin-remote-execution-script \
--foreman-proxy-puppetca "true" \
--puppet-ca-server "capsule-ca.example.com" \
--puppet-dns-alt-names "loadbalancer.example.com" \
--puppet-server-ca "true"
```

5. On Capsule Server, enter the **satellite-installer** command:

```
# satellite-installer --scenario capsule \
--certs-cname "loadbalancer.example.com" \
--certs-tar-file "certs.tgz" \
--enable-foreman-proxy-plugin-remote-execution-script \
--enable-puppet \
--foreman-proxy-foreman-base-url "https://satellite.example.com" \
--foreman-proxy-oauth-consumer-key "oauth key" \
--foreman-proxy-oauth-consumer-secret "oauth secret" \
--foreman-proxy-puppetca "true" \
--foreman-proxy-register-in-foreman "true" \
--foreman-proxy-trusted-hosts "satellite.example.com" \
--foreman-proxy-trusted-hosts "capsule-ca.example.com" \
--puppet-ca-server "capsule-ca.example.com" \
--puppet-dns-alt-names "loadbalancer.example.com" \
--puppet-server true \
--puppet-server-ca "true"
```

6. On Capsule Server, generate Puppet certificates for all other Capsules that you configure for load balancing, except this first system where you configure Puppet certificates signing:

```
# puppet cert generate capsule.example.com \
--dns_alt_names=loadbalancer.example.com
```

This command creates the following files on the Puppet certificate signing Capsule Server instance:

- **/etc/puppetlabs/puppet/ssl/certs/ca.pem**
- **/etc/puppetlabs/puppet/ssl/certs/capsule.example.com.pem**
- **/etc/puppetlabs/puppet/ssl/private_keys/capsule.example.com.pem**
- **/etc/puppetlabs/puppet/ssl/public_keys/capsule.example.com.pem**

4.4.3. Configuring remaining Capsule Servers with custom SSL certificates for load balancing

Complete this procedure for each Capsule Server excluding the system where you configure Capsule Server to sign Puppet certificates.

Procedure

1. Append the following option to the **capsule-certs-generate** command that you obtain from the output of the **katello-certs-check** command:

```
--foreman-proxy-cname loadbalancer.example.com
```

2. On Satellite Server, enter the **capsule-certs-generate** command to generate Capsule certificates:

```
# capsule-certs-generate \
--certs-tar /root/capsule_cert/capsule.tar \
--foreman-proxy-cname loadbalancer.example.com \
--foreman-proxy-fqdn capsule.example.com \
--server-ca-cert /root/capsule_cert/ca_cert_bundle.pem \
--server-cert /root/capsule_cert/capsule.pem \
--server-key /root/capsule_cert/capsule.pem
```

Retain a copy of the example **satellite-installer** command from the output for installing Capsule Server certificates.

3. Copy the certificate archive file from Satellite Server to Capsule Server.

```
# scp /root/capsule.example.com-certs.tar
root@capsule.example.com:capsule.example.com-certs.tar
```

4. On Capsule Server, install the **puppetserver** package:

```
# satellite-maintain packages install puppetserver
```

5. On Capsule Server, create directories for puppet certificates:

```
# mkdir -p /etc/puppetlabs/puppet/ssl/certs/ \
/etc/puppetlabs/puppet/ssl/private_keys/ \
/etc/puppetlabs/puppet/ssl/public_keys/
```

6. On Capsule Server, copy the Puppet certificates for this Capsule Server from the system where you configure Capsule Server to sign Puppet certificates:

```
# scp root@capsule-ca.example.com:/etc/puppetlabs/puppet/ssl/certs/capsule.example.com.pem
/etc/puppetlabs/puppet/ssl/certs/capsule.example.com.pem
# scp root@capsule-ca.example.com:/etc/puppetlabs/puppet/ssl/certs/ca.pem
/etc/puppetlabs/puppet/ssl/certs/ca.pem
# scp root@capsule-ca.example.com:/etc/puppetlabs/puppet/ssl/private_keys/capsule.example.com.pem
/etc/puppetlabs/puppet/ssl/private_keys/capsule.example.com.pem
# scp root@capsule-ca.example.com:/etc/puppetlabs/puppet/ssl/public_keys/capsule.example.com.pem
/etc/puppetlabs/puppet/ssl/public_keys/capsule.example.com.pem
```

7. On Capsule Server, change the **/etc/puppetlabs/puppet/ssl/** directory ownership to user **puppet** and group **puppet**:

```
# chown -R puppet:puppet /etc/puppetlabs/puppet/ssl/
```

8. On Capsule Server, set the SELinux context for the **/etc/puppetlabs/puppet/ssl/** directory:

```
# restorecon -Rv /etc/puppetlabs/puppet/ssl/
```

9. Append the following options to the **satellite-installer** command that you obtain from the output of the **capsule-certs-generate** command:

```
--certs-cname "loadbalancer.example.com" \
--enable-foreman-proxy-plugin-remote-execution-script \
--foreman-proxy-puppetca "false" \
--puppet-ca-server "capsule-ca.example.com" \
--puppet-dns-alt-names "loadbalancer.example.com" \
--puppet-server-ca "false"
```

10. On Capsule Server, enter the **satellite-installer** command:

```
# satellite-installer --scenario capsule \
--certs-cname "loadbalancer.example.com" \
--certs-tar-file "capsule.example.com-certs.tar" \
--enable-foreman-proxy-plugin-remote-execution-script \
--foreman-proxy-foreman-base-url "https://satellite.example.com" \
--foreman-proxy-oauth-consumer-key "oauth key" \
--foreman-proxy-oauth-consumer-secret "oauth secret" \
--foreman-proxy-puppetca "false" \
--foreman-proxy-register-in-foreman "true" \
--foreman-proxy-trusted-hosts "satellite.example.com" \
--foreman-proxy-trusted-hosts "capsule.example.com" \
--puppet-ca-server "capsule-ca.example.com" \
--puppet-dns-alt-names "loadbalancer.example.com" \
--puppet-server-ca "false"
```

-

CHAPTER 5. SETTING THE LOAD BALANCER FOR HOST REGISTRATION

You can configure Satellite to register clients through a load balancer when using the host registration feature.

You will be able to register hosts to the load balancer instead of Capsule. The load balancer will decide through which Capsule to register the host at the time of request. Upon registration, the subscription manager on the host will be configured to manage content through the load balancer.

Prerequisites

- You configured SSL certificates on all Capsule Servers. For more information, see Chapter 4, *Configuring Capsule Servers for load balancing* .
- You enabled Registration and Templates plugins on all Capsule Servers:

```
# satellite-installer \
--foreman-proxy-registration true \
--foreman-proxy-templates true
```

Procedure

1. On all Capsule Servers, set the registration and template URLs using **satellite-installer**:

```
# satellite-installer \
--foreman-proxy-registration-url "https://loadbalancer.example.com:9090" \
--foreman-proxy-template-url "http://loadbalancer.example.com:8000"
```

2. In the Satellite web UI, navigate to **Infrastructure** > **Capsules**.
3. For each Capsule, click the dropdown menu in the **Actions** column and select **Refresh**.

CHAPTER 6. INSTALLING THE LOAD BALANCER

The following example provides general guidance for configuring an HAProxy load balancer using Red Hat Enterprise Linux 8 server. However, you can install any suitable load balancing software solution that supports TCP forwarding.

Procedure

1. Install HAProxy:

```
# dnf install haproxy
```

2. Install the following package that includes the **semanage** tool:

```
# dnf install policycoreutils-python-utils
```

3. Configure SELinux to allow HAProxy to bind any port:

```
# semanage boolean --modify --on haproxy_connect_any
```

4. Configure the load balancer to balance the network load for the ports as described in Table 6.1, "Ports configuration for the load balancer". For example, to configure ports for HAProxy, edit the **/etc/haproxy/haproxy.cfg** file to correspond with the table. For more information, see Configuration example for haproxy.cfg for HAProxy load balancer with Satellite 6 in the *Red Hat Knowledgebase*.

Table 6.1. Ports configuration for the load balancer

Service	Port	Mode	Balance Mode	Destination
HTTP	80	TCP	roundrobin	port 80 on all Capsule Servers
HTTPS and RHSM	443	TCP	source	port 443 on all Capsule Servers
Anaconda for template retrieval	8000	TCP	roundrobin	port 8000 on all Capsule Servers
Puppet (*Optional*)	8140	TCP	roundrobin	port 8140 on all Capsule Servers
PuppetCA (*Optional*)	8141	TCP	roundrobin	port 8140 only on the system where you configure Capsule Server to sign Puppet certificates
Capsule HTTPS for Host Registration and optionally OpenSCAP	9090	TCP	roundrobin	port 9090 on all Capsule Servers

5. Configure the load balancer to disable SSL offloading and allow client-side SSL certificates to pass through to back end servers. This is required because communication from clients to Capsule Servers depends on client-side SSL certificates.

6. Start and enable the HAProxy service:

```
# systemctl enable --now haproxy
```

CHAPTER 7. VERIFYING THE LOAD BALANCING CONFIGURATION

Use this procedure to verify the load balancing configuration for each Capsule Server.

Procedure

1. Shut down the base operating system for your Capsule Server.
2. Verify that content or subscription management features are available on clients registered to this Capsule. For example, enter the **subscription-manager refresh** command on a client.
3. Restart the base operating system for your Capsule Server.

CHAPTER 8. REGISTERING CLIENTS TO THE LOAD BALANCER

To balance the load of network traffic from clients, you must register the clients to the load balancer.

To register clients, proceed with one of the following procedures:

- Section 8.1, "Registering clients using host registration"
- Section 8.2, "**(Deprecated)** Registering clients using the bootstrap script"

8.1. REGISTERING CLIENTS USING HOST REGISTRATION

You can register hosts with Satellite using the host registration feature in the Satellite web UI, Hammer CLI, or the Satellite API. For more information, see Registering Hosts in *Managing hosts*.

Prerequisites

- You have set the load balancer for host registration. For more information, see Chapter 5, *Setting the load balancer for host registration* .

Procedure

1. In the Satellite web UI, navigate to **Hosts** > **Register Host**.
2. From the **Capsule** dropdown list, select the load balancer.
3. Select **Force** to register a host that has been previously registered to a Capsule Server.
4. From the **Activation Keys** list, select the activation keys to assign to your host.
5. Click **Generate** to create the registration command.
6. Click on the *files* icon to copy the command to your clipboard.
7. Connect to your host using SSH and run the registration command.
8. Check the **/etc/yum.repos.d/redhat.repo** file and ensure that the appropriate repositories have been enabled.

CLI procedure

1. Generate the host registration command using the Hammer CLI:

```
# hammer host-registration generate-command \
--activation-keys "My_Activation_Key"
```

If your hosts do not trust the SSL certificate of Satellite Server, you can disable SSL validation by adding the **--insecure** flag to the registration command.

```
# hammer host-registration generate-command \
--activation-keys "My_Activation_Key" \
--insecure true
```

Include the **--smart-proxy-id *My_Capsule_ID*** option. You can use the ID of any Capsule Server that you configured for host registration load balancing. Satellite will apply the load balancer to the registration command automatically.

Include the **--force** option to register a host that has been previously registered to a Capsule Server.

2. Connect to your host using SSH and run the registration command.
3. Check the **/etc/yum.repos.d/redhat.repo** file and ensure that the appropriate repositories have been enabled.

API procedure

1. Generate the host registration command using the Satellite API:

```
# curl -X POST https://satellite.example.com/api/registration_commands \
--user "My_User_Name" \
-H 'Content-Type: application/json' \
-d '{ "registration_command": { "activation_keys": ["My_Activation_Key_1,
My_Activation_Key_2"] }}'
```

If your hosts do not trust the SSL certificate of Satellite Server, you can disable SSL validation by adding the **--insecure** flag to the registration command.

```
# curl -X POST https://satellite.example.com/api/registration_commands \
--user "My_User_Name" \
-H 'Content-Type: application/json' \
-d '{ "registration_command": { "activation_keys": ["My_Activation_Key_1,
My_Activation_Key_2"], "insecure": true }}'
```

Use an activation key to simplify specifying the environments. For more information, see Managing Activation Keys in *Managing content*.

Include **{ "smart_proxy_id": *My_Capsule_ID* }**. You can use the ID of any Capsule Server that you configured for host registration load balancing. Satellite will apply the load balancer to the registration command automatically.

Include **{ "force": true }** to register a host that has been previously registered to a Capsule Server.

To enter a password as a command line argument, use **username:password** syntax. Keep in mind this can save the password in the shell history. Alternatively, you can use a temporary personal access token instead of a password. To generate a token in the Satellite web UI, navigate to **My Account** > **Personal Access Tokens**.

2. Connect to your host using SSH and run the registration command.
3. Check the **/etc/yum.repos.d/redhat.repo** file and ensure that the appropriate repositories have been enabled.

8.2. (DEPRECATED) REGISTERING CLIENTS USING THE BOOTSTRAP SCRIPT

To register clients, enter the following command on the client. You must complete the registration procedure for each client.

Prerequisites

- Ensure that you install the bootstrap script on the client and change file permissions of the script to executable. For more information, see Registering Hosts to Red Hat Satellite Using The Bootstrap Script in *Managing hosts*.

Procedure

- On Red Hat Enterprise Linux 8, enter the following command:

```
# /usr/libexec/platform-python bootstrap.py \
--activationkey="My_Activation_Key" \
--enablerepos=satellite-client-6-for-rhel-8-<arch>-rpms \ 1
--force \ 2
--hostgroup="My_Host_Group" \
--location="My_Location" \
--login=admin \
--organization="My_Organization" \
--puppet-ca-port 8141 \ 3
--server loadbalancer.example.com
```

1. Replace **<arch>** with the client architecture, for example **x86**.
2. Include the **--force** option to register the client that has been previously registered to a standalone Capsule.
3. Include the **--puppet-ca-port 8141** option if you use Puppet.

- On Red Hat Enterprise Linux 7 or 6, enter the following command:

```
# python bootstrap.py --login=admin \
--activationkey="My_Activation_Key" \
--enablerepos=rhel-7-server-satellite-client-6-rpms \
--force \ 1
--hostgroup="My_Host_Group" \
--location="My_Location" \
--organization="My_Organization" \
--puppet-ca-port 8141 \ 2
--server loadbalancer.example.com
```

1. Include the **--force** option to register the client that has been previously registered to a standalone Capsule.
2. Include the **--puppet-ca-port 8141** option if you use Puppet.

The script prompts for the password corresponding to the Satellite user name you entered with the **--login** option.

CHAPTER 9. PROPAGATING SCAP CONTENT THROUGH THE LOAD BALANCER

If you use OpenSCAP to manage security compliance on your clients, you must configure the SCAP client to send ARF reports to the load balancer instead of Capsule. The configuration procedure depends on the method you have selected to deploy compliance policies.

9.1. PROPAGATING SCAP CONTENT USING ANSIBLE DEPLOYMENT

Using this procedure, you can promote Security Content Automation Protocol (SCAP) content through the load balancer in the scope of the Ansible deployment method.

Prerequisites

- Ensure that you have configured Satellite for Ansible deployment of compliance policies. For more information, see Configuring Compliance Policy Deployment Methods in *Managing security compliance*.

Procedure

1. In the Satellite web UI, navigate to **Configure** > **Ansible** > **Variables**.
2. Search for the **foreman_scap_client_port** variable and click its name.
3. In the **Default Behavior** area, ensure that the **Override** checkbox is selected.
4. In the **Parameter Type** list, ensure that **integer** is selected.
5. In the **Default Value** field, enter **9090**.
6. In the **Specify Matchers** area, remove all matchers that override the default value.
7. Click **Submit**.
8. Search for the **foreman_scap_client_server** variable and click its name.
9. In the **Default Behavior** area, ensure that the **Override** checkbox is selected.
10. In the **Parameter Type** list, ensure that **string** is selected.
11. In the **Default Value** field, enter the FQDN of your load balancer, such as ***loadbalancer.example.com***.
12. In the **Specify Matchers** area, remove all matchers that override the default value.
13. Click **Submit**.
14. Continue with deploying a compliance policy using Ansible. For more information, see:
    - Deploying a Policy in a Host Group Using Ansible in *Managing security compliance*
    - Deploying a Policy on a Host Using Ansible in *Managing security compliance*

Verification

- On the client, verify that the **/etc/foreman_scap_client/config.yaml** file contains the following lines:

```
# Foreman proxy to which reports should be uploaded
:server: 'loadbalancer.example.com'
:port: 9090
```

9.2. PROPAGATING SCAP CONTENT USING PUPPET DEPLOYMENT

Using this procedure, you can promote Security Content Automation Protocol (SCAP) content through the load balancer in the scope of the Puppet deployment method.

Prerequisites

- Ensure that you have configured Satellite for Puppet deployment of compliance policies. For more information, see Configuring Compliance Policy Deployment Methods in *Managing security compliance*.

Procedure

1. In the Satellite web UI, navigate to **Configure** > **Puppet ENC** > **Classes**.
2. Click **foreman_scap_client**.
3. Click the **Smart Class Parameter** tab.
4. In the pane to the left of the **Smart Class Parameter** window, click **port**.
5. In the **Default Behavior** area, select the **Override** checkbox.
6. From the **Key Type** list, select **integer**.
7. In the **Default Value** field, enter **9090**.
8. In the pane to the left of the **Smart Class Parameter** window, click **server**.
9. In the **Default Behavior** area, select the **Override** checkbox.
10. From the **Key Type** list, select **string**.
11. In the **Default Value** field, enter the FQDN of your load balancer, such as ***loadbalancer.example.com***.
12. In the lower left of the **Smart Class Parameter** window, click **Submit**.
13. Continue with deploying a compliance policy using Puppet. For more information, see:
    - Deploying a Policy in a Host Group Using Puppet in *Managing security compliance*
    - Deploying a Policy on a Host Using Puppet in *Managing security compliance*

Verification

- On the client, verify that the **/etc/foreman_scap_client/config.yaml** file contains the following lines:

```
# Foreman proxy to which reports should be uploaded
:server: 'loadbalancer.example.com'
:port: 9090
```