# Upgrading to Kerberos V5 from Kerberos V4

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The implementation of the Yarrow pseudo-random number generator in src/lib/crypto/yarrow has the following copyright:



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The implementation of the AES encryption algorithm in src/lib/crypto/aes has the following copyright:

# 1 Introduction

As with most software upgrades, Kerberos V5 is generally backward compatible but not necessarily forward compatible. The Kerberos V5 daemons can interoperate with Kerberos V4 clients, but most of the Kerberos V4 daemons can not interoperate with Kerberos V5 clients. This suggests the following strategy for performing the upgrade:

1. **Upgrade your KDCs.** This must be done first, so that interactions with the Kerberos database, whether by Kerberos V5 clients or by Kerberos V4 clients, will succeed.
2. **Upgrade your servers.** This must be done before upgrading client machines, so that the servers are able to respond to both Kerberos V5 and Kerberos V4 queries.
3. **Upgrade your client machines.** Do this only after your KDCs and application servers are upgraded, so that all of your Kerberos V5 clients will be talking to Kerberos V5 daemons.

# 2 Configuration Files

The Kerberos `krb5.conf` and KDC `kdc.conf` configuration files allow additional tags for Kerberos V4 compatibility.

## 2.1 krb5.conf

If you used the defaults, both when you installed Kerberos V4 and when you installed Kerberos V5, you should not need to include any of these tags. However, some or all of them may be necessary for nonstandard installations.

### 2.1.1 [libdefaults]

In the [libdefaults] section, the following additional tags may be used:

**krb4_srvtab**
: Specifies the location of the Kerberos V4 srvtab file. Default is /etc/srvtab.

**krb4_config**
: Specifies the location of the Kerberos V4 configuration file. Default is /etc/krb.conf.

**krb4_realms**
: Specifies the location of the Kerberos V4 domain/realm translation file. Default is /etc/krb.realms.

### 2.1.2 [realms]

In the [realms] section, the following Kerberos V4 tags may be used:

**default_domain**
: Identifies the default domain for hosts in this realm. This is needed for translating V4 principal names (which do not contain a domain name) to V5 principal names. The default is your Kerberos realm name, converted to lower case.

**v4_instance_convert**
: This subsection allows the administrator to configure exceptions to the default_domain mapping rule. It contains V4 instances (tag name) which should be translated to some specific hostname (tag value) as the second component in a Kerberos V5 principal name.

**v4_realm**
: This relation allows the administrator to configure a different realm name to be used when converting V5 principals to V4 ones. This should only be used when running separate V4 and V5 realms, with some external means of password sychronization between the realms.

### 2.1.3 AFS and the Appdefaults Section

Many Kerberos 4 sites also run the Andrew File System (AFS).

Modern AFS servers (OpenAFS > 1.2.8) support the AFS 2b token format. This allows AFS to use Kerberos 5 tickets rather than version 4 tickets, enabling cross-realm authentication. By default, the 'krb524d' service will issue the new AFS 2b tokens. If you are using old AFS servers, you will need to disable these new tokens. Please see the documentation of the `appdefaults` section of 'krb5.conf' in the Kerberos Administration guide.

## 2.2 kdc.conf

Because Kerberos V4 requires a different type of salt for the encryption type, you will need to change the `supported_enctypes` line in the [realms] section to:

```
supported_enctypes = des-cbc-crc:normal des-cbc-crc:v4
```

This is the only change needed to the `kdc.conf` file.

# 3 Upgrading KDCs

To convert your KDCs from Kerberos V4 to Kerberos V5, do the following:

1. Install Kerberos V5 on each KDC, according to the instructions in the Kerberos V5 Installation Guide, up to the point where it tells you to create the database.
2. Find the `kadmind` (V4) daemon process on the master KDC and kill it. This will prevent changes to the Kerberos database while you convert the database to the new Kerberos V5 format.
3. Create a dump of the V4 database in the directory where your V5 database will reside by issuing the command:
   ```
   % kdb_util dump /usr/local/var/krb5kdc/v4-dump
   ```
4. Load the V4 dump into a Kerberos V5 database, by issuing the command:
   ```
   % kdb5_util load_v4 v4-dump
   ```
5. Create a Kerberos V5 stash file, if desired, by issuing the command:
   ```
   % kdb5_util stash
   ```
6. Proceed with the rest of the Kerberos V5 installation as described in the Kerberos V5 Installation Guide. When you get to the section that tells you to start the `krb5kdc` and `kadmind` daemons, first find and kill the Kerberos V4 `kerberos` daemon on each of the KDCs. Then start the `krb5kdc` and `kadmind` daemons as You will need to specify an argument to the `-4` command line option to enable Kerberos 4 compatibility. See the `krb5kdc` man page for details. directed. Finally, start the Kerberos V5 to V4 ticket translator daemon, `krb524d`, by issuing the command:
   ```
   % /usr/local/sbin/krb524d -m > /dev/null &
   ```
   If you have a stash file and you start the `krb5kdc` and `kadmind` daemons at boot time, you should add the above line to your `/etc/rc` (or `/etc/rc.local`) file on each KDC.

# 4 Upgrading Application Servers

Install Kerberos V5 on each application server, according to the instructions in the Kerberos V5 Installation Guide, with the following exceptions:

- In the file `/etc/services`, add or edit the lines described in the Kerberos V5 Installation Guide, with the following exception:

  in place of:

  ```
  kerberos      88/udp    kdc    # Kerberos V5 KDC
  kerberos      88/tcp    kdc    # Kerberos V5 KDC
  ```

  add instead:

  ```
  kerberos-sec  88/udp    kdc    # Kerberos V5 KDC
  kerberos-sec  88/tcp    kdc    # Kerberos V5 KDC
  ```

- Convert your Kerberos V4 srvtab file to Kerberos V5 keytab file as follows:

  ```
  # /usr/local/sbin/ktutil
  ktutil:  rst /etc/krb-srvtab
  ktutil:  wkt /etc/krb5.keytab
  ktutil:  q
  #
  ```

# 5 Upgrading Client machines

Install Kerberos V5 on each client machine, according to the instructions in the Kerberos V5 Installation Guide.

Tell your users to add the appropriate directory to their paths. On UNIX machines, this will probably be `/usr/local/bin`.

Note that if you upgrade your client machines before all of your application servers are upgraded, your users will need to use the Kerberos V4 programs to connect to application servers that are still running Kerberos V4. (The one exception is the UNIX version of Kerberos V5 telnet, which can connect to a Kerberos V4 and Kerberos V5 application servers.) Users can use either the Kerberos V4 or Kerberos V5 programs to connect to Kerberos V5 servers.

# 6 Firewall Considerations

Kerberos V5 uses port 88, which is the port assigned by the IETF, for KDC requests. Kerberos V4 used port 750. If your users will need to get to any KDCs outside your firewall, you will need to allow TCP and UDP requests on port 88 for your users to get to off-site Kerberos V5 KDCs, and on port 750 for your users to get to off-site Kerberos V4 KDCs.

# Table of Contents