Artelys

OPTIMIZATION SOLUTIONS

Artelys License Manager 15.0
User's Manual

Artelys License Manager User's Manual

Version 15.0

Artelys S.A.S.

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Contents

1 Introduction

The Artelys license manager is used to authorize software distributed by Artelys. Currently, Artelys and partners distribute Knitro, the premier solver for nonlinear optimization problems, and AMPL, one the best modeling languages for optimization applications. The Artelys license manager is embedded in distributed software and requires activation with an appropriate license before a product can be used. The license manager supports stand-alone licenses and floating network licenses; both are explained in this manual.

All licenses are granted for a particular product and release number, and are valid up to a fixed expiration date. For example, Knitro 5.0 licenses are not valid for the Knitro 5.1 release. Customers who purchase Annual License Maintenance Support will be given new licenses for new releases; other customers must purchase a new license with a new release.

The Artelys license manager is fully supported on the following operating systems:

- Linux (64-bit, RedHat (glibc2.5+) compatible).

- Mac OS X (64-bit x86_64, Mac OS X 10.8 (Mountain Lion) or later).

- Windows (32-bit and 64-bit for Windows Server 2008, Vista, Windows 7, Windows 8, Windows 8.1 and Windows 10).

2   Stand-Alone Licenses

The stand-alone license manager is for Artelys distributed products that run on a single machine. A unique machine ID number is generated, and a license created for your machine. Processes are not authorized unless they run on the licensed machine.

The license is a short text string, encoded in a printable subset of ASCII characters. It is usually stored in a text file, and can be conveniently cut and pasted using any text-based tool. Here is an example license string in encoded form:

```
=l9tUgSvY-C1+JCi640a287DeVQQjw5p-SKYZQPGt2BJU9rnC0+=
```
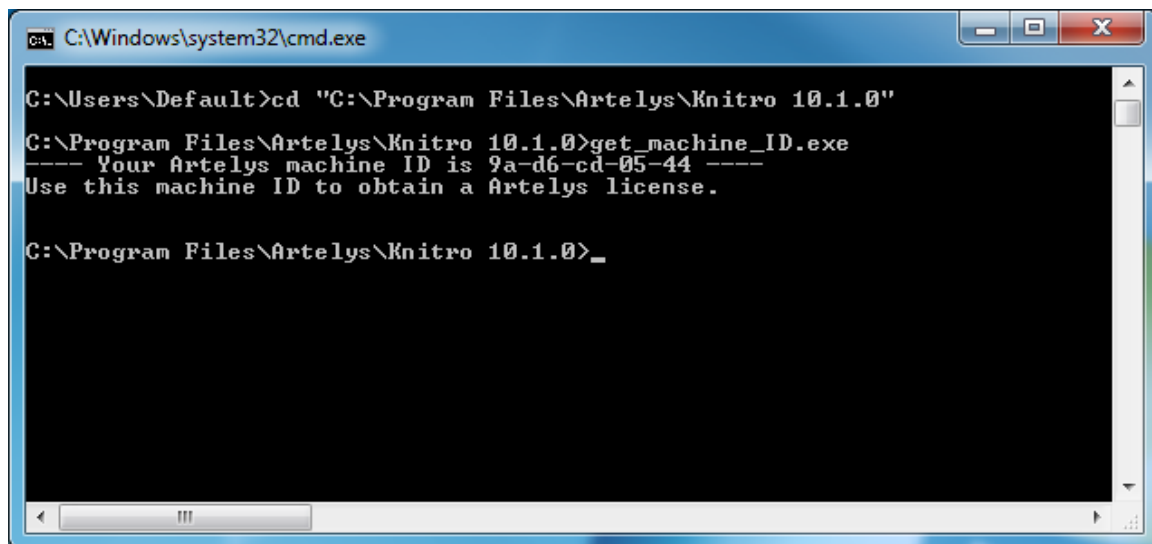
The steps for installing a stand-alone license are:

1. Obtain the machine ID and email it to Artelys (or your local distributor).

2. Copy license files sent from Artelys (or your local distributor) to the correct location.

3. Begin using your Artelys distributed software product.

2.1   Obtain the machine ID

Locate your copy of the `get_machine_ID` program shipped with the Artelys distribution. If you cannot find a copy that runs on the server machine, then request a copy from Artelys (support-knitro@artelys.com). Run the program on your license server machine.

On Windows, double-click on the `get_machine_ID.bat` batch file provided with the distribution. Alternatively, open a DOS-like command window (click Start → Run, and then type cmd). Change to the directory where you unzipped the distribution, and type `get_machine_ID.exe`. (Note, you will not be able to see the program's output by clicking on the `get_machine_ID.exe` file name in Windows Explorer.) The screen shot below shows a command window with the machine ID for a Knitro distribution that is unzipped to its default location:

On Unix, open a terminal window, change to the directory where you unzipped the distribution, and type `./get_machine_ID`. The output looks like this:

```
---- Your Artelys machine ID is b9-6d-7e-a9-cf ----
Use this machine ID to obtain an Artelys license.
```

Refer to section 4.3 if you see the error message:

```
*** Could not determine a machine ID for Artelys license.
Please contact support-knitro@artelys.com about this problem.
```

Assuming this is not a student version, you email the line containing the hexadecimal machine ID to your local distributor or support-knitro@artelys.com, if purchased directly from Artelys. Artelys or your local distributor will email back one or more encrypted license files. Each license file authorizes operation of an Artelys distributed product on your machine. The licenses will only work on this machine.

2.2   Install licenses in the correct location

Artelys supports a variety of ways to install licenses. The simplest procedure is to copy each Artelys license into a separate file located in the same directory as the product that requires the license. Other options for more complex situations are described below. Note that any time the license is placed in a file, the file *must* have a name that begins with the characters "artelys_" (lower-case letters and the underscore are required).

Here is a list of possible ways to install the license. Choose the most appropriate for your system configuration.

- Place all license files in the same directory as the products that require the license. This option is most convenient if there is only one copy of the Artelys distributed product.

- Set an environment variable named `ARTELYS_LICENSE` to the contents of the license. This option executes fastest, but is limited to a single license.

  If you run Windows, this can be done as follows:

  Windows 8 and later

  1. From the Windows Start screen, search for and open `Edit the system environment variables`.
  2. Click the Advanced tab.
  3. Click Environment Variables.
  4. Under `System variables`, click on `New`. Specify the `Variable name` as `ARTELYS_LICENSE` and the `Variable value` to be the contents of the license string.

  Windows Vista and Windows 7

  1. At the Windows desktop, right-click `Computer`.
  2. Select `Properties`.
  3. Click on `Advanced System Settings` in the left pane.
  4. In the `System Properties` window select the `Advanced` tab.
  5. Click `Environment Variables`.
  6. Under `System variables`, click on `New`. Specify the `Variable name` as `ARTELYS_LICENSE` and the `Variable value` to be the contents of the license string.

Windows XP

1. At the Windows desktop, right-click `My Computer`.
2. Select `Properties`.
3. Click the `Advanced` tab.
4. Click `Environment Variables`.
5. Under `System variables`, click on `New`. Specify the `Variable name` as `ARTELYS_LICENSE` and the `Variable value` to be the contents of the license string.

For Unix systems (inlcuding Mac OS X):

If you run a bash shell, then type

> `export ARTELYS_LICENSE=`*license string*

If you run a csh or tcsh shell, then type

> `setenv ARTELYS_LICENSE` *license string*

- Set an environment variable named `ARTELYS_LICENSE` to the name of the license file. Be sure and provide the full pathname to the file.

- Set an environment variable named `ARTELYS_LICENSE` to the parent directory of the license file. Be sure and provide the full pathname to the directory. This option is useful if you have more than one license.

- Place the license files in a special predefined directory. On Unix machines, the value of environment variable `$HOME` determines special directories at `$HOME` and `$HOME/.artelys`. On Windows machines, the special folder is at `%HOMEDRIVE%:\Program Files\Artelys` (usually, `%HOMEDRIVE%` equals `C:`).

The Artelys license manager will look in all of these locations for a valid license file. You can see the list of places that the license manager looks by enabling debug messages (section 4.1). The Artelys license manager will look for a valid license in the following order:

1. Check for a high volume network floating license (see Section 3.8);

2. Check for stand-alone license defined by the ARTELYS␣LICENSE environment variable;

3. Check for a standard network floating license by checking whether the ARTELYS␣LICENSE␣NETWORK␣ADDR environment variable is set (see Section 3);

4. Check all standard directory locations for a stand-alone license file.

If you have both a stand-alone license and a network license on the same machine, you can force it to use the stand-alone license by setting the ARTELYS␣LICENSE environment variable in any of the ways described above, as well as disabling any calls for high volume licenses (see Section 3.8). Otherwise, if this environment variable is not set, the Artelys license manager will search for a network floating license first. You can speed up the license check for a stand-alone license by setting the ARTELYS␣LICENSE environment variable.

2.3 Running your Artelys distributed products

Now you can start applications on your machine. They should find an Artelys license silently and execute.

If Knitro is called using the programming interface (C, C++, Fortran, or Java), then the license manager looks for a license when `KN_new` is called. Resources associated with the license manager (memory, file descriptors, etc.) are released when `KN_free` is called. Refer to the *Knitro User's Manual* for more information about the callable library interface.

3   Floating Network Licenses

Floating network licenses allow a product to be used on any machine that has network access to the Artelys license server on the same Ethernet local access network (LAN). You install an Artelys license server on your network and supply it with product licenses. Licenses are "checked out" when a user starts the product, and "checked in" when the user finishes. You purchase a fixed number of concurrent licenses that limits how many users can be running the product at the same time. The steps for installing your floating network license manager are:

1. Choose a machine to host the Artelys license server.

2. Install the license server program.

3. Obtain the machine ID and email it to Artelys or your local distributor.

4. Copy license files sent from Artelys (or your local distributor) to the correct location.

5. Start the license server.

6. Configure each user machine to find the license server.

7. Begin using your Artelys distributed software product.

3.1   Choose the server machine

The Artelys license server is installed on a single machine in your computer network. We will refer to this as the **server machine**. Your first step is to choose a suitable server machine to host the license server. Artelys will create licenses keyed to this machine, so the license server cannot be moved after installation.

Software that requires Artelys license authorization may be copied to any **user machine**; but each copy must be able to establish and maintain a TCP network connection with the server machine. *The server machine and all user machines must be on the same LAN.*

The Artelys license server listens for user machine requests on a specific network port. The default port number is 8349. Typically, this port is available and does not conflict with other TCP-enabled applications. If there is a conflict, then the port number can be changed, but it requires reconfiguration of the Artelys license server. See section 4.4 for more information.

In some configurations the user machine must cross through a firewall to reach the server machine. In this case, you must open the firewall for port 8349. For example, a Windows 10 machine running the Windows firewall will prompt with a question about "zLicServer" the first time the license server is started. You should allow access on private and domain networks, and then the firewall will allow user machine requests to reach the license server. See section 4.5 for more details about firewalls and proxy mechanisms.

3.2 Install the license server program

Unzip and unpack the Artelys license manager distribution into a directory on your server machine. A clean directory is recommended. The directory can be anywhere on your machine; however, on Windows the service install batch files expect the license manager to be in a directory named `C:\Program Files\Artelys\ZLMServer`.

The license server is named "zLicServer" (or "zLicServer.exe" on Windows). Artelys will send a version of the program that runs on the operating system of your server machine. Copy the program to any directory on the server machine. Try running the program. On Windows, open a DOS-like command window and type `zLicServer.exe`. On Unix, open a terminal window and type `./zLicServer --nobg`. Since you have no floating licenses yet, you should see the following message:

```
*** No license files found -- exiting.
***    Floating licenses must be located in the same directory
***    as the zLicServer executable, must have a name beginning
***    with 'artelys_', and must be created for this machine's ID.
***    Please consult the Artelys license manager manual,
***    or contact support-knitro@artelys.com.
```

3.3 Obtain the server machine ID

Locate your copy of the `get_machine_ID` program shipped with the Artelys distribution. If you cannot find a copy that runs on the server machine, then request a copy from Artelys (support-knitro@artelys.com). Run the program on your license server machine.

Section 2.1 provides details on running `get_machine_ID`. Briefly, on Windows, double-click on the `get_machine_ID.bat` batch file provided with the distribution (or, alternatively, open a DOS-like command window and type `get_machine_ID.exe`). On Unix, open a terminal window and type `./get_machine_ID`. The output looks like this:

```
---- Your Artelys machine ID is b9-6d-7e-a9-cf ----
Use this machine ID to obtain an Artelys license.
```

Email the line containing the hexadecimal machine ID to your local distributor or support-knitro@artelys.com, if purchased directly from Artelys. Artelys or your local distributor will email back one or more encrypted license files. Each license file authorizes a certain number of concurrent users for an Artelys distributed product. The licenses will only work on the server machine, and can only be used as floating network licenses.

3.4 Install licenses in the correct location

Copy the licenses into separate files in the same directory where you placed the server program "zLicServer". Unlike stand-alone licenses, the floating licenses must be located in this directory. Each file must have a name that begins with the characters "artelys_" (lower-case letters and the underscore are required).

3.5   Running the license server program

Unix operating systems (Linux, Mac OS X, and Solaris)

Starting the license server. The command is

```
> ./zLicServer [--log] [--nobg]
```

By default the license server becomes a background process and remains running even after you log out. The "`--nobg`" option tells the license server not to become a background process. The "`--log`" option causes the license server to write activity to a file named `log_zlicserver.txt` in the same directory as the "zLicServer" program.

Stopping the license server. If you started it with the "`--nobg`" option, then type control-C to halt it. If it is running in the background, then type `./stopLicServer`.

Setting the listening interface. The license server opens a port for listening on one network interface of the server machine. By default, it listens on (or "binds to") the interface that maps to the host name of the machine. Machines can have multiple network interfaces, each with a different IP address.

Start the license server with the "`--log`" option and check the log to see the IP address that the license server is listening on. Look in `log_zlicserver.txt` for a line with something like:

```
17:10:40  4/25/2006  started listening on 127.0.0.1:8349.
```

If the default value (127.0.0.1 in this example) is not the IP address that user machines can reach, then you must tell the license server the correct address. First, find the correct IP address by "pinging" the server machine from a user machine. Then set an environment variable named `ARTELYS_LICENSE_NETWORK_ADDR` with this address and restart the license server.
If you run a bash shell, then type
`> export ARTELYS_LICENSE_NETWORK_ADDR=`*ip address*
If you run a csh or tcsh shell, then type
`> setenv ARTELYS_LICENSE_NETWORK_ADDR` *ip address*

The example above shows the license server listening on port 8349 of IP address 127.0.0.1. This particular IP address is the standard "loopback" address assigned to all machines. It is used for off-network operations and is not reachable by any other machine. Hence, in this example, you must discover the IP address of the server machine with "ping", set the environment variable, and restart "zLicServer".

Windows operating systems

Running the license server as a foreground process. Open a DOS-like command window and type

```
> zLicServer.exe [--log]
```

The "`--log`" option causes the license server to write activity to a file named `log_zlicserver.txt` in the same directory as the "zLicServer.exe" program.

The "zLicServer.exe" program runs in the foreground, and requires you to stay logged in and keep the DOS-like window open. To stop the server, type `control-C` or run `stopLicServer.exe`.

Running the license server as a Windows service. You may choose to install the license server as a Windows service. In this case the license server runs in the background, and keeps running even if you log out. It is managed like any other Windows service, and can be configured to start manually, or to start when your machine boots. To install, open a DOS-like command window and type

```
> installAsWindowsService.bat
[SC] CreateService SUCCESS
```

You should see the "SUCCESS" message. If you install the license server files to a directory other than `C:\Program Files\Artelys\ZLMServer`, then edit `installAsWindowsService.bat` and change the path name accordingly.

Installing the service does not start it. Use the standard Windows service manager GUI/applet to start and stop the zLicServerWinSvc service. From the desktop, click Start → Control Panel → Administrative Tools → Services (Classic Windows view), or Start → Control Panel → Performance and Maintenance → Administrative Tools → Services (new Windows XP view), or open a DOS-like command windows and type `services.msc`. Then scroll down and find the service named "zLicServerWinSvc". Right-click on it to bring up options to start or stop the service, or modify its properties. To enable logging, add "`--log`" to the service start parameters, as described in section 4.1.

To uninstall the Windows service, first stop it, then run `uninstallAsWindowsService.bat`.

Setting the listening interface. The license server opens a port for listening on one network interface of the server machine. Machines can have multiple network interfaces, each with a different IP address.

Start the license server as a foreground process with the "`--log`" option and check the log to see the IP address that the license server is listening on. Look in `log_zlicserver.txt` for a line with something like:

```
17:10:40  4/25/2006  started listening on 192.168.1.1:8349.
```

If the default value (192.168.1.1 in this example) is not the IP address that user machines can reach, then you must tell the license server the correct address. First, find the correct IP address by "pinging" the server machine from a user machine. Then set an environment variable named `ARTELYS_LICENSE_NETWORK_ADDR` with this address and restart the license server.

If running the license server as a foreground process, then before starting it type

`> set ARTELYS_LICENSE_NETWORK_ADDR=`*ip address*

If running the license server as a Windows service, then define a new environment variable using the system properties GUI (Start → My Computer/Properties → Advanced → Environment Variables). Name the variable `ARTELYS_LICENSE_NETWORK_ADDR` and set its value to the desired IP address. See Section 2.2 for more details on how to use the system properties GUI in Windows to permanently set an environment variable.

3.6 Configure user machines to find the license server

You may copy Artelys distributed software (Knitro or AMPL) that uses a floating network license to any number of user machines on the same LAN. You must tell each user machine where the Artelys license server is located by setting an environment variable named `ARTELYS_LICENSE_NETWORK_ADDR`. First, "ping" the server machine from the user machine to find its IP address. Then set the environment variable with the address that the license server is listening on. Include the port number of the server if it differs from the default port number 8349.

- If you run a Unix bash shell, then type

  > export ARTELYS␣LICENSE␣NETWORK␣ADDR=*ip address:port*

- If you run a Unix csh or tcsh shell, then type

  > setenv ARTELYS␣LICENSE␣NETWORK␣ADDR *ip address:port*

- If you run on Windows, then open a DOS-like command window and type

  > set ARTELYS␣LICENSE␣NETWORK␣ADDR=*ip address:port*

3.7   Running your Artelys distributed products

Now you can start applications on user machines. They should obtain an Artelys license silently and execute. When an application starts, it "checks out" a license from the license server, and "checks in" the license when it finishes. If all licenses are currently checked out, the application will halt after printing a message

> License found, but all copies are checked out

You must wait until a free license becomes available (or purchase more concurrent licenses). Check the "zLicServer" log file to see which user machines have a license checked out. The rules below help explain when licenses are checked out and checked in.

- For the AMPL product:

  - An AMPL license is checked out when an AMPL session starts, and checked in when the AMPL session ends.

- For the Knitro product:

  - If Knitro is called within a modeling language (e.g., AMPL) to solve an optimization problem, then a license is checked out until the solve command completes or is aborted. Some modeling environments may differ in behavior.

  - If Knitro is called using the programming interface (C, C++, Fortran, or Java), then a license is checked out when KN␣new is called and checked in when KN␣free is called. Knitro also provides functions that can check out a license and reuse it, as described in section 3.8 below. Refer to the *Knitro User's Manual* for more information about the callable library interface.

A license is "lost" by an application if the network connection between the user machine and server machine is broken. In this case the license server immediately considers the license checked in.

3.8   High volume license use by Knitro

Some applications solve a sequence of optimization problems using Knitro, creating a new instance of the Knitro solver for each problem. An example is a web application server providing optimization services. Each time the application creates (or destroys) a new Knitro solver, a license is checked out (or checked in), which takes time, consumes network bandwidth, and loads the Artelys license server. If the optimization problems are solved quickly, then license overhead becomes significant. The Artelys license manager provides **high volume** license functions to greatly reduce this overhead.

Two special functions are provided with the Knitro callable library programmatic interface: KN_checkout_license and KN_release_license. An application program may call these functions (from C, C++, or Java) to obtain a single floating license and reuse it to start a sequence of Knitro instances. If the application needs to run multiple concurrent Knitro instances, then it must check out enough licenses to support the maximum number of concurrent instances.

Modifying an application to use a high volume license is easy. As an example, suppose the application runs Knitro instances in a loop. Then simply check out a license before the loop, release it at the end, and use KN_new_lm instead of KN_new to pass the license to Knitro. Here is a fragment of C code that shows how to make the calls:

```c
#include "knitro.h"
/*... Include other headers, define main() ...*/

KN_context  *kc;
LM_context  *lmc;
int error;
/*... Declare other local variables ...*/

/* OBTAIN AN ARTELYS KNITRO LICENSE FOR REUSE. */
error = KN_checkout_license(&lmc);
if (error || lmc == NULL)
{
    printf ("Failed to obtain an Artelys license.\n");
    return( -1 );
}

/* LOOP, CREATING A NEW KNITRO SOLVER INSTANCE EACH TIME.
 * REUSE THE SAME LICENSE TO AVOID OVERHEAD. */
while (...)
{
    error = KN_new_lm (lmc, &kc);
    /*... define the optimization problem and solve it ...*/
    KN_free (&kc);
}

/* RELEASE THE ARTELYS KNITRO LICENSE. */
KN_release_license (&lmc);
```

Any floating license for Knitro can be checked out as a reusable high volume license. The license is "lost" if the network connection between the application and the license server is broken. The license server will detect this condition and consider the license checked in. The Knitro instance will detect the condition and terminate because it no longer has a license.

4 Trouble-Shooting

4.1 Enable debugging output

Useful debugging messages are produced by setting the environment variable `ARTELYS_LICENSE_DEBUG` to any value.

- If you run a Unix bash shell, then type

  ```
  > export ARTELYS_LICENSE_DEBUG=1
  ```

- If you run a Unix csh or tcsh shell, then type

  ```
  > setenv ARTELYS_LICENSE_DEBUG 1
  ```

- If you run on Windows, then open a DOS-like command window and type

  ```
  > set ARTELYS_LICENSE_DEBUG=1
  ```

The stand-alone license manager usually displays debugging output at the terminal. Typical debug messages show where the license manager looks for license files.

The floating network license server displays debugging output in the log file, so logging should be enabled with the "`--log`" option. Debug lines begin with the characters "`--Z--`". Typical debugging messages show which license files are used, the listening IP address and port, and any networking errors (see section 4.2 for an example).

To turn off debug messages, unset the environment variable:

- If you run a Unix bash shell, then type

  ```
  > unset ARTELYS_LICENSE_DEBUG
  ```

- If you run a Unix csh or tcsh shell, then type

  ```
  > unsetenv ARTELYS_LICENSE_DEBUG
  ```

- If you run Windows, then type

  ```
  > set ARTELYS_LICENSE_DEBUG=
  ```

To capture debug output from a network floating license manager running as a Windows service, you must enable logging (but there is no need to set an environment variable). Do this using the Windows services properties GUI. From the desktop, click Start → Control Panel → Administrative Tools → Services (Classic Windows view), or Start → Control Panel → Performance and Maintenance → Administrative Tools → Services (Windows 10 view), or open a DOS-like command window and type `services.msc`. Then scroll down and find the service named "zLicServerWinSvc". Right-click and select Properties. Stop the service if it is running. Then type "`--log`" in the Start parameters box, as shown below. Start the service and it will log with debugging information.
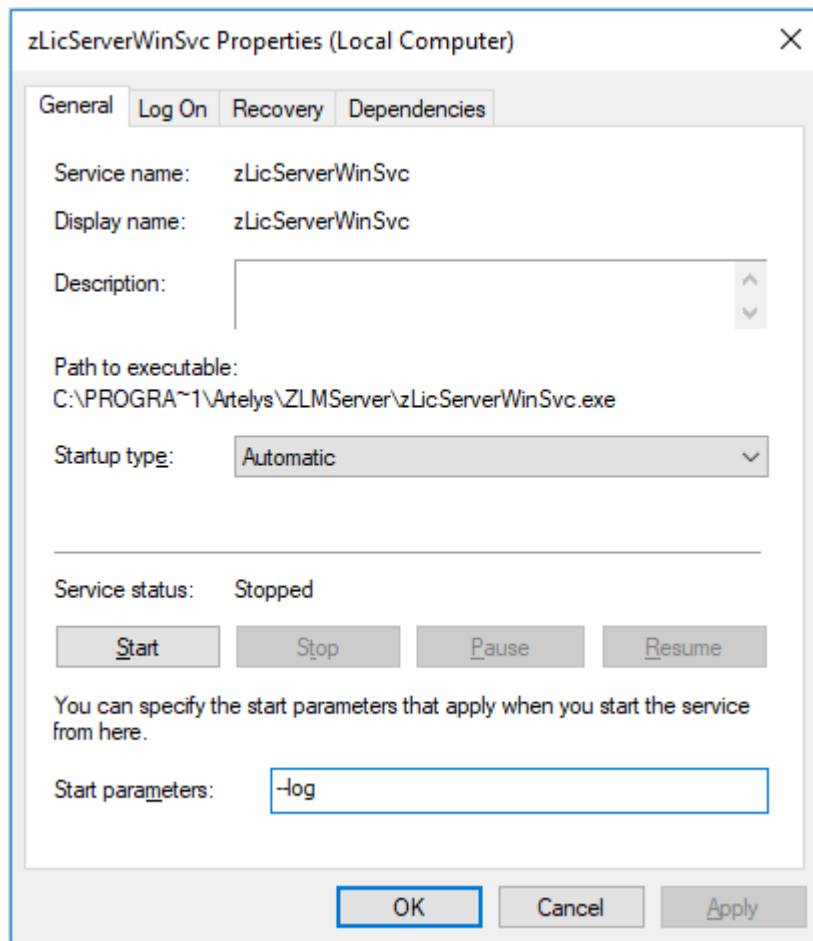
4.2 Reading the network license server log

Start the "zLicServer" program with option "`--log`" to generate a log file of license server activity. The log file is named `log_zlicserver.txt` and is found in the same directory as the "zLicServer" program. The license server always appends to the log file without erasing previous entries. Since the file can become large over time, we recommend using the "`--log`" option only when trouble-shooting, or deleting the log file at regular intervals. The file can be deleted or renamed at any time without disturbing operation of the license server.

The example output below shows the contents of a log file if two applications try to check out a single license. The first application succeeds, while the second is refused. Each request begins with a new TCP connection initiated by the application; the IP address and port number seen by the license server are shown in the log. Each new connection is also given an identification number that counts up from 1. The ID appears at the beginning of each TCP-related log message. The application request is processed, and a reply made as rapidly as possible. The numbers in parentheses associated with "`Replied to TCP request`" are the number of data bytes sent from the license server; this might be useful if correlating server activity with network monitoring tools.

```
16:52:51  7/10/2007
16:52:51  7/10/2007  ------------------------------------------------
16:52:51  7/10/2007  Artelys license server started. (Built Jul 10 2007)
16:52:51  7/10/2007  ARTELYS_LICENSE_DEBUG is null.
16:52:51  7/10/2007  ARTELYS_LICENSE_NETWORK_ADDR = '172.22.1.55'.
16:52:51  7/10/2007  Using these license files:
16:52:51  7/10/2007    './artelys_licTest.txt'.
16:52:51  7/10/2007  Started listening on 172.22.1.55:8349.
16:53:06  7/10/2007  [1] New connection accepted from 172.22.1.44:669.
16:53:06  7/10/2007  [1] Processing TCP request.
16:53:06  7/10/2007  [1] Available license found.
16:53:06  7/10/2007  [1] Replied to TCP request (40).
16:53:17  7/10/2007  [2] New connection accepted from 172.22.1.44:1437.
16:53:17  7/10/2007  [2] Processing TCP request.
16:53:17  7/10/2007  [2] No license found.
16:53:17  7/10/2007  [2] Replied to TCP request (104).
16:53:17  7/10/2007  [2] Closing connection.
16:53:33  7/10/2007  [1] Closing connection.
```

The log file below shows the start of the log file when debugging is enabled. The additional lines of output describe the steps that the license server goes through to identify license files and to open a socket for listening (this example is for Linux).

```
16:54:12  7/10/2007
16:54:12  7/10/2007  ------------------------------------------------
16:54:12  7/10/2007  Artelys license server started. (Built Jul 10 2007)
16:54:12  7/10/2007  ARTELYS_LICENSE_DEBUG = '1'.
16:54:12  7/10/2007  --Z-- Searching directory '.' for license files.
16:54:12  7/10/2007  --Z-- Reading './artelys_net.txt' as a possible license.
16:54:12  7/10/2007  --Z-- Reading './artelys_standalone.txt' as a possible license
.
16:54:12  7/10/2007   ARTELYS_LICENSE_NETWORK_ADDR = '172.22.1.55'.
16:54:12  7/10/2007  --Z-- querying DNS for address to '172.22.1.55'...
16:54:12  7/10/2007  --Z--   DNS lookup returned successfully.
16:54:12  7/10/2007  --Z-- binding socket to the address, at port 8349...
16:54:12  7/10/2007  --Z--   bind successful, socket maps to '172.22.1.55:8349'
16:54:12  7/10/2007  --Z-- Checking file './artelys_net.txt'.
16:54:12  7/10/2007  --Z-- Checking file './artelys_standalone.txt'.
16:54:12  7/10/2007  --Z--   is not a floating license.
16:54:12  7/10/2007  Using these license files:
16:54:12  7/10/2007    './artelys_net.txt'.
16:54:12  7/10/2007  Started listening on 172.22.1.55:8349.
```
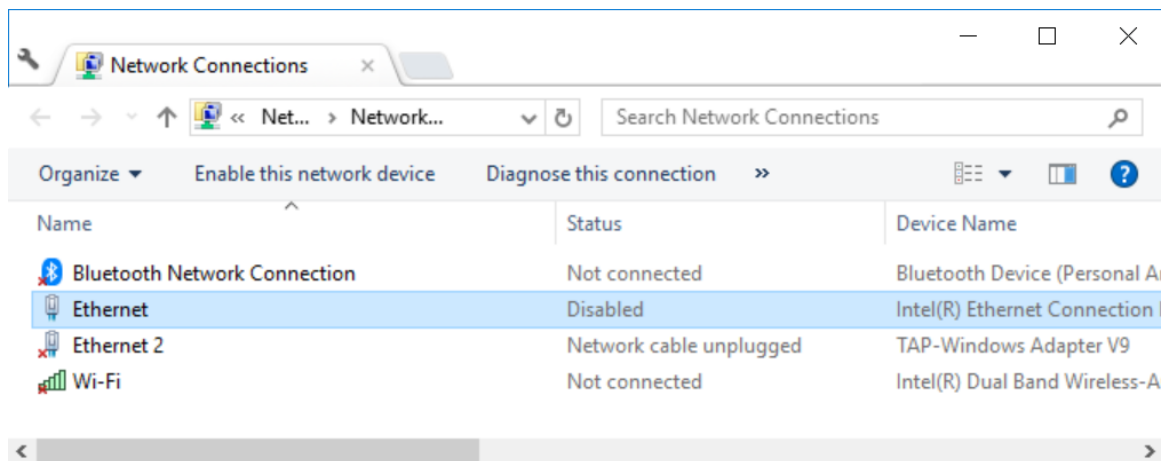
4.3 Machine ID problems

The Artelys machine ID is partly determined by the Ethernet physical address of your machine. This section discusses common issues with Ethernet addresses that can cause problems for the license manager.

If an Ethernet address cannot be found, then the machine ID cannot be determined. Your machine must have a network interface card, installed with a valid software driver. On most operating systems, the network interface must also be enabled, though not necessarily connected. On Windows, failure to find a network interface causes the error message:

```
*** Error getting Windows adapters info: 232.
*** Could not determine a machine ID forArtelys license.
```

This message may appear when running `get_machine_ID.exe`, or it may appear in the network license server log file.

On Windows, it is not unusual to have a network interface disabled for security purposes. The license manager only requires that the interface be enabled; for instance, you can enable the interface but leave the cable unplugged if you want to run an Artelys-licensed product but need to keep the machine off-line. To enable a network interface, bring up the Windows network connections GUI, right-click on an interface, and select "Enable". The image below is a Windows Classic view (Start → Control Panel → Network and Internet Connections → Network Connections) that shows a disabled interface.


Machine ID problems can also occur if your machine has multiple network interfaces. A common example is a laptop with an Ethernet NIC (network interface card) and built-in wireless. If both interfaces are enabled at the time `get_machine_ID.exe` is run, then the license manager will arbitrarily chose one interface to be part of the machine ID. Suppose the ID chooses the wireless interface address. You email that ID to Artelys and receive a product license for your machine. Later, if the wireless interface becomes disabled and you try to run the product, then the license manager will complain that there is no valid license. If you now run `get_machine_ID.exe`, it will generate a different machine ID because it is using a different network interface.

The fix in this case is to make sure your machine ID uses a NIC that can be enabled at any time. You can see which Ethernet address is used in the machine ID by adding the flag "`-v`" as follows

```
get_machine_ID.exe -v
```

The image below shows a Windows 10 view (Start → Control Panel → Network and Internet Connections → Network Connections) of a laptop with several interfaces. In this example all the interfaces are enabled, but disconnected; hence, eligible to be part of the machine ID.
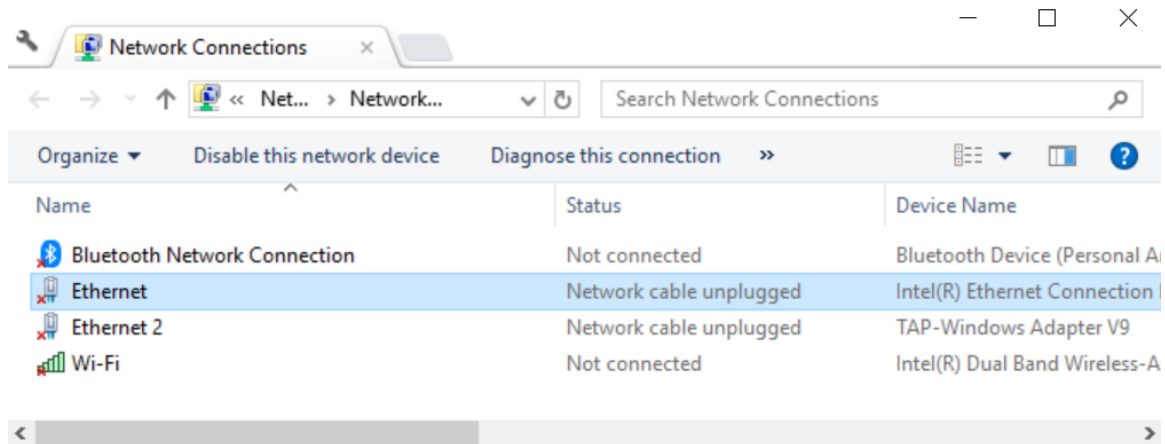
4.4   Changing the network license server listening port

By default, the Artelys network license server listens on port 8349. You may need to change the port number; for example, if the port is already in use on your local network by some other application.

The port number is part of the licensing security system and is built into the license server software. It cannot be changed after installation. To change the port you must contact Artelys and get a new license server.

Before contacting Artelys you must determine a port number that will work. Ask your network administrator for permission to use a port that is not used by any other application on the server machine. Artelys will open the port for listening on the machine that hosts the license server. The port must accept incoming TCP requests using a proprietary Artelys protocol. The port must maintain a TCP connection for as long as the user checks out a license; depending on your needs, this might be a few seconds or several days. Artelys products will not send keep-alive messages to the license server.

If you are the network administrator, then your biggest problem is to figure out an available port. Port numbers range between 1 and 65535, but keep in mind that many numbers below 1000 are reserved, and that Unix port numbers less than 1024 require `root` privileges (i.e., the Artelys license server would have to be started by `root`).

Try executing "netstat -a" (same command for Windows or Linux) to see what ports are currently in use. Search for entries with the words "LISTEN". For example, if you see

```
tcp   0   0   mymachine:8349    *:*      LISTEN
```

then the port 8349 is already in use (the line above is from Linux and may look slightly different on other operating systems). Be warned, however, that "netstat" only shows ports used by applications that are currently running. It has no knowledge of applications that are not executing.

4.5 Network license server issues

User machines must be able to make a TCP connection with the Artelys floating license server and be on the same LAN as the server machine. If there is a firewall between the two machines, then a firewall rule must be added that allows inbound connections to the server on port 8349. Typically, firewall rules designate a TCP connection for a specific application on a specific port. For example, if the license server runs on a Windows 10 machine with Windows firewall active, then the first time the license server starts you will be prompted by the firewall, as shown below.
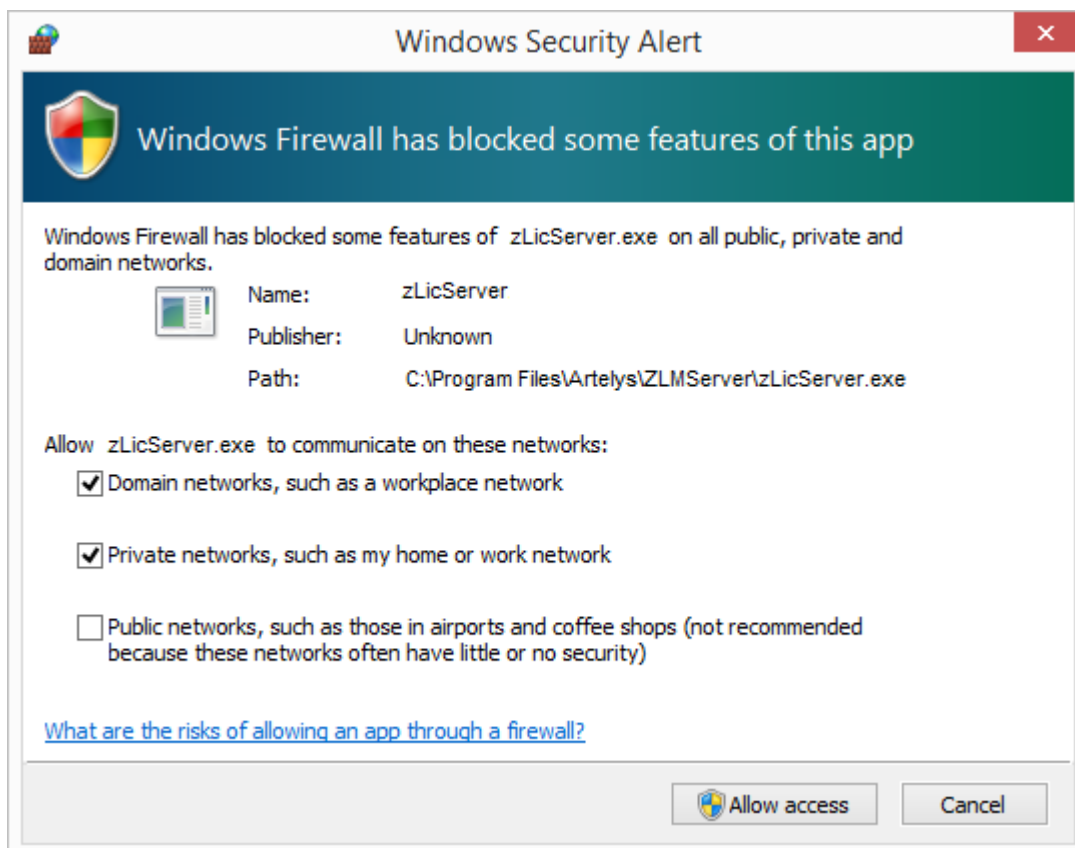
Check the network types for which you want to allow zLicServer ("Domain" and "Private" networks should be enough) and press "Allow access". Windows will create a firewall rule that allows inbound connections to the port and application shown. The firewall will still block external requests to other ports and applications. Security of the server machine is weakened only slightly; for instance, if the Artelys license server is off then a rogue application could conceivably start using port 8349 on the server. A simple defense is to leave the Artelys license server on, as Windows will not allow two different applications to bind the same port for listening at the same time (i.e., the theoretical rogue application cannot receive anything on the port).

More sophisticated systems may use a reverse proxy to front the server machine, a forward proxy for user machines, or combination of proxy servers and firewalls. It should be possible to devise rules

or install gateway relay software to enable license server functionality. The server machine must be able to accept incoming TCP requests using a proprietary Artelys protocol on the license server port. The TCP connection must be maintained for as long as the user checks out a license (Artelys products will not send keep-alive messages to the license server). User machines will send a request with one IP data packet and receive a one packet response to check out and hold a license. Please contact support-knitro@artelys.com with questions or problems.

4.6   Windows performance counters issues

Artelys license manager uses performance counters to work on Windows. For some reasons, performance counters are sometimes missing or disabled. This can be fixed by manually enabling or rebuilding performance counters.

The following steps (from Microsoft Support KB2554336) will allow users to fix these issues.

4.6.1   Ensure that the counters are not disabled in the registry

The counters may be disabled via registry settings. Check the following registry locations to ensure that the counters have not been disabled.

```
HKLM\System\CurrentControlSet\Services\%servicename%\Performance
```

Where `%servicename%` represents any service with a performance counter. For example: `PerfDisk`, `PerfOS`, etc.

There may be registry keys for `DisablePerformanceCounters` in any of these locations. For each of the existing keys, check that the value is 0 and otherwise, set it to 0 and restart computer.

4.6.2   Rebuild performance counters

If performance counters were not disabled, then they might need to be rebuilt.
To rebuild all Performance counters, type the following commands at an Administrative command prompt. Press ENTER after each command:

```
cd c:\windows\system32
lodctr /R
cd c:\windows\sysWOW64
lodctr /R
```