# ACAM 100 Acoustical Camera
# User Manual

### Version 1.2

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# Introduction and System Requirements

The Signal Interface Group ACAM 100 Acoustic Camera is an acoustic array, a sensor containing an array of microphones, an optical camera, and a CCM (communications and control module). The CCM is located in a small box on the back of the acoustic camera; it is connected to the PC through a USB cable. The CCM implements the hardware interface between the ACAM 100 Acoustic Camera and a PC.

The CcmAccess software is the interface between the ACAM 100 Acoustic Camera and a PC application is the. The CcmAccess software includes a Windows dll and a Windows service.

A Windows application provides the user interface to the ACAM 100 Acoustic Camera. All applications require the CcmAccess software.

The CcmAccess software has the following system requirements:
- Windows 7 or higher
- 64-bit processor
- 64-bit operating system
- at least one free USB port

Applications of the ACAM 100 Acoustic Camera typically are computationally intensive. Depending on the application, the following may be required:
- recent generation core-i5 or core-i7 processor
- graphics processor
- at least 8 Gb RAM

# **Installation**

The CcmAccess software is installed using file CcmAccess.msi which can be downloaded at
www.signalinterface.com\ftp.shtml.

When the CCM is plugged into a USB port for the first time, the Windows Device Manager will search the internet for appropriate hardware drivers, starting with this message:
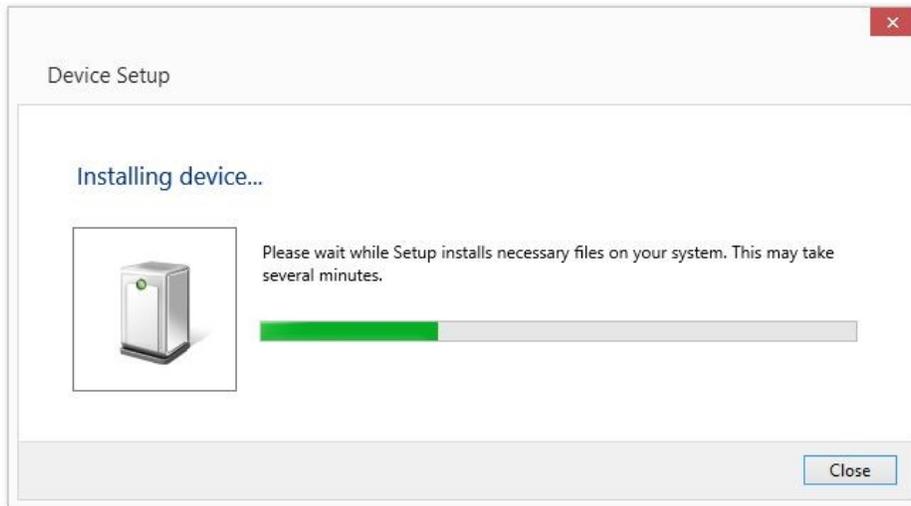


Device Setup (Windows 8)

Follow all prompts until the device is installed.

If the internet is available, we recommend allowing Windows to install the device in this manner. Windows will install a USB driver from FTDI.

If the internet is not available, a version of the required USB driver is available at
www.signalinterface.com\ftp.shtml. Note that this version of the driver may not be the most recent, but it has been tested for compatability with the CcmAccess software.

To install the CcmAccess software, double click on the file CcmAccess.msi, and follow the prompts.
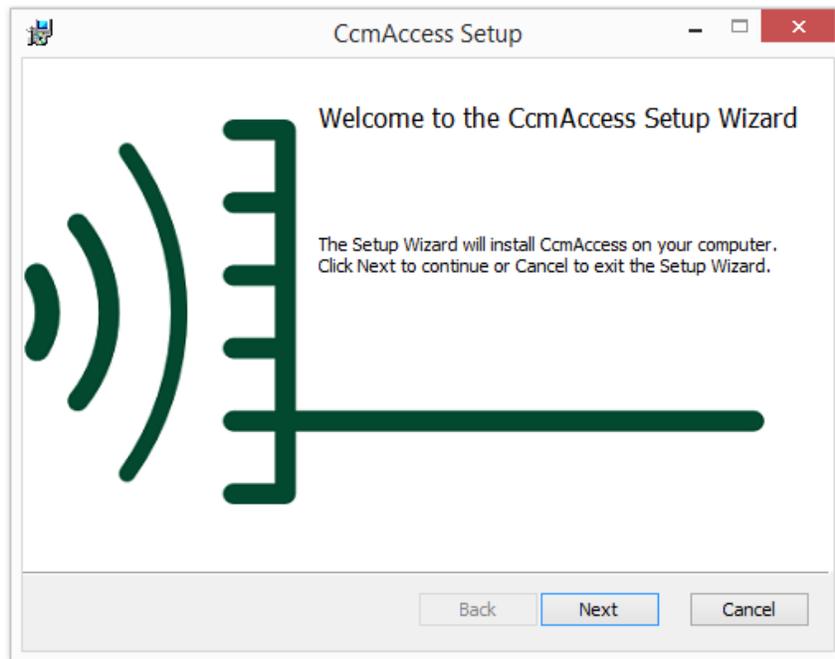


Agree to the terms of the license agreement by checking the box at the bottom left. This enables the "Next" button and allows you to continue the installation.
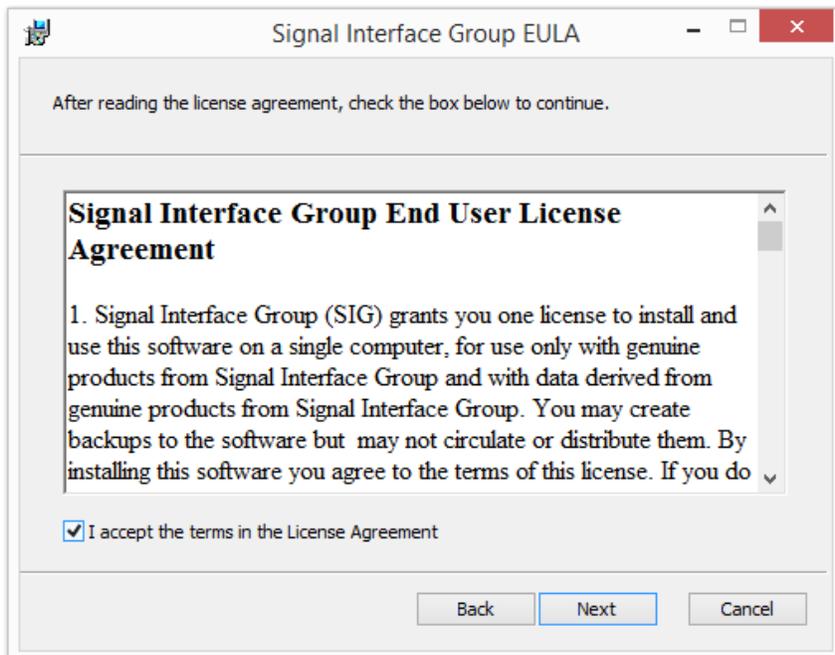
Select the path you want for the documentation and programmers tools. The system files CcmService.Exe and CcmApi.Dll are installed in the Windows 64-bit System folder (typically C:\Windows\System32).
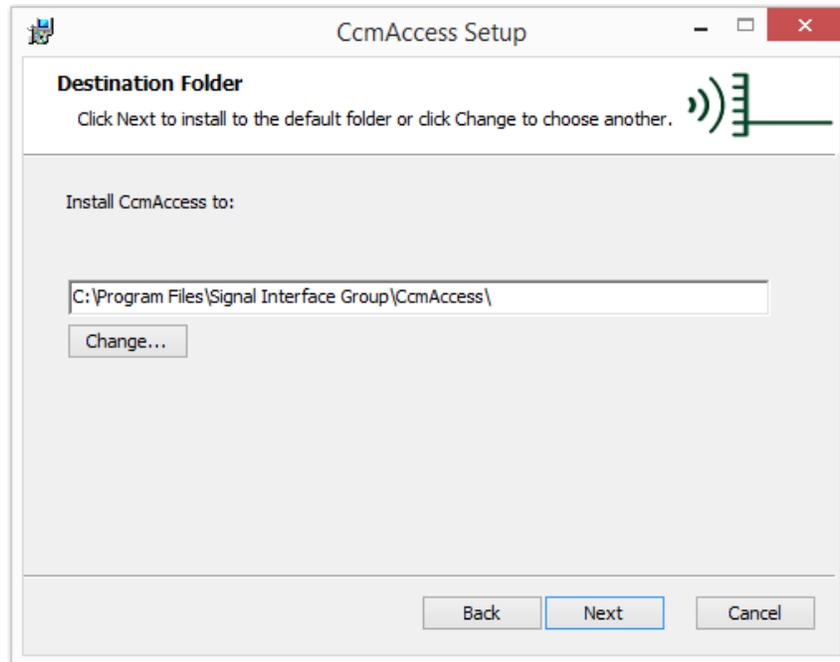


Click "Install" to begin the installation.
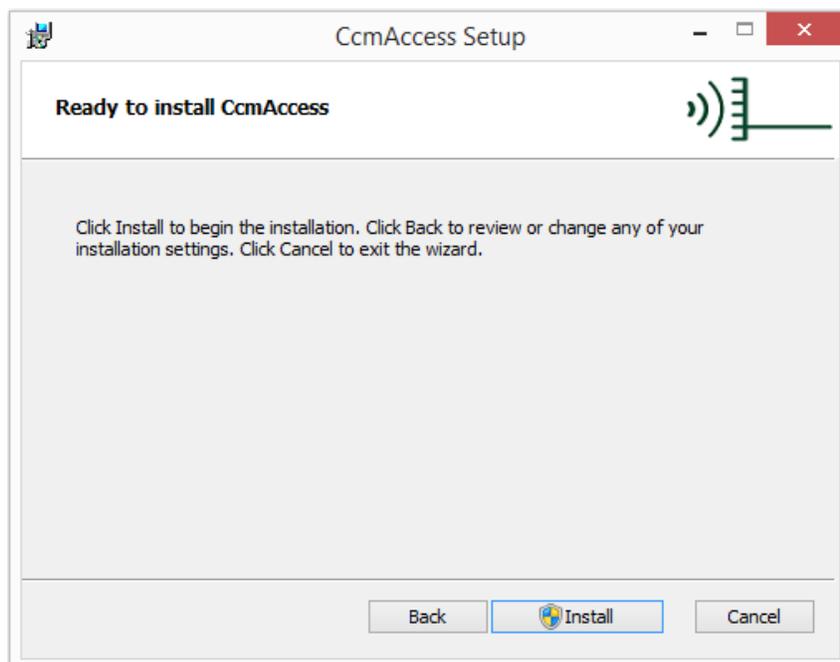
After clicking the Install button, there may be a small delay, after which the following warning will be displayed. Select "Yes" to continue installation.



After this, the progress of the installation will be displayed. If no errors or further warning messages occur, the installation was successful. If the array is plugged into a USB port, a red LED on the communications and control module on the back of the array should begin flashing within five seconds.
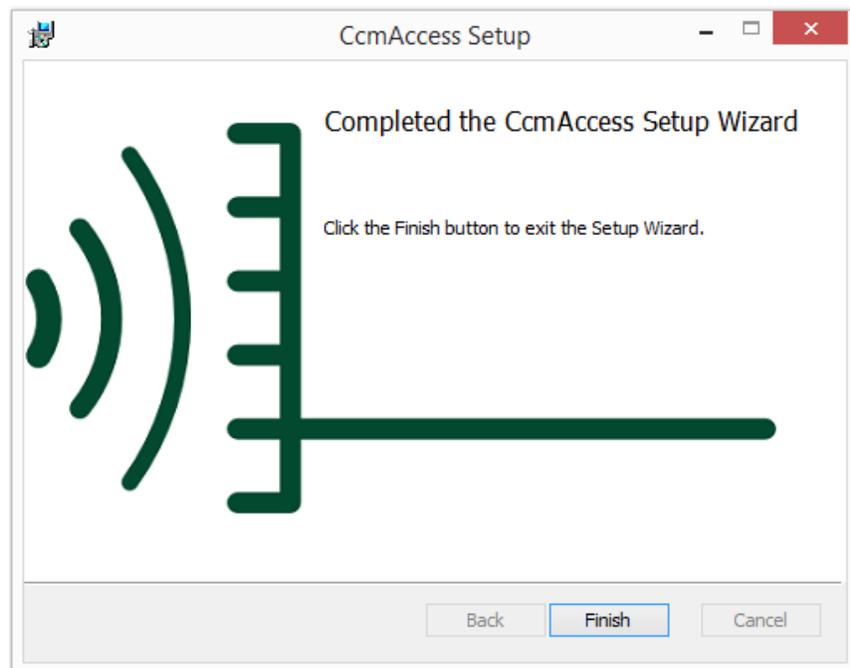


Communication can be tested by running one of the CcmTest.exe files located in the Examples\VB\CcmTest folder. If successful, running the program will display the Model, Serial Number and part Description for the array.

This page covers three specialized topics.

# Buffering and USB Latency

The USB 2.0 port transfers raw data at a maximum rate of 480M bits/second. With overhead the USB port can transfer data reliably at an average rate of about 30MB/second.

USB performance depends on the PC and on how the PC is loaded. The PC can stop servicing the USB port for an indefinite period, typically leading to occasional delays of up to 100 milliseconds.

The USB latency period is the maximum time from when the PC application sends data or commands until the CCM receives the data or commands. The CCM has a large local buffer to compensate for USB latency. This buffer normally is configured as more than 12M 32-bit input samples distributed between the CCM hardware, the PC's USB driver and SIG's interface software.

# CcmService

The low-level hardware interface of the ACAM 100 is controlled by a Windows service, CcmService.Exe. It is installed and started as part of the CcmAccess install process. Once started, the service periodically checks for connection of a CCM device. Once connected, the service establishes communication with the CCM. After this has been done, application software can access the hardware using the CcmApi DLL (CcmApi.DLL).

CcmService will write status and error messages to the Windows Application Event Log. To view these messages, run the Event Viewer program from the Administrative Tools folder. Find the Application log entries under the Windows Logs folder. Note that many programs place entries into this log. The CcmService entries can be found easily by sorting by "source".

The normal status messages are Service Started, Service Stopped, USB Connected, USB Disconnected, CCM Available, and CCM Configuration Loaded. Service errors will contain an error message and a set of numbers that can be useful for troubleshooting.

# CcmAccess Programming API

Applications can be developed using a the provided programming API (ccmapi.dll). Refer to the separate CcmAccess API manual for details.

# Appendix A. Troubleshooting

Problem: Unable to install CcmAccess

Q: Are you logged in as an administrator?

If not, log in as an administrator and try again.

Q: Are you connected to the internet?

An internet connection may be required for a first time install. If a connection is not available, refer to the Installation section of this manual for instructions on obtaining the appropriate USB device driver.

Q: Was the USB device installed when plugged in for the first time?

If you did not see the Device Setup message shown under Installation:

- Open the Device Manager
- Under Universal Serial Bus controllers, look for "USB Serial Converter"
- If not found, right-click on "Universal Serial Bus controllers" and select "Scan for hardware changes"
- If still not found, try a different USB port and/or USB cable

Q: Does the computer meet the minimum system requirements?

If not, the computer cannot be used with CcmAccess software.

Q: Is an application running that uses CcmAccess?

If so, close the application and try again.

Q: Is the target folder (as selected when running the install program) or any of its subfolders open?

If so, close the folders and try again.

Problem: CcmAccess installs correctly, but then nothing happens

Q: Is the USB cable plugged in?

    If not, plug in the USB cable to both the array and the computer

    Look inside the array assembly, near the USB port. Do you see a red blinking light? If so, the device is operating correctly.

Q: Are you using the USB cable that came with the array?

    If not, try a different cable. USB data cables that are shorter and thicker provide the best operation.

Q: Is CcmService running?

    Verify the service is running as follows:

- Open the Control Panel
- Open Administrator Tools
- Open Services
- Search for "CCM Data Access" under the Name column.
- Verify the Status column shows "Running" and the Startup Type is "Automatic".

    If the service is not running, start the service by double-clicking on "CCM Data Access" and pressing the Start button.

    Look inside the array assembly, near the USB port. Do you see a red blinking light? If so, the device is operating correctly. The light should start blinking within five seconds of plugging it into the USB.

    If the service is running but there is no blinking light, use the Event Viewer as described below to determine the state of the CcmAccess software.

## Event Viewer

If none of the previous steps helped, the Windows Event Viewer can be used to determine the state of the CcmService software.

Launch the Event Viewer as follows:

- Open the Control Panel
- select Administrator Tools
- select Event Viewer
- At the left, expand Windows Logs, then select Application
- Wait for the events to load (this may take several seconds)
- Search for recent CcmService events under Source column

Note the exclamation point (!) after the number of events. This shows that new events have been generated since the events were loaded. Select "Refresh" at the right in order to view these new events.
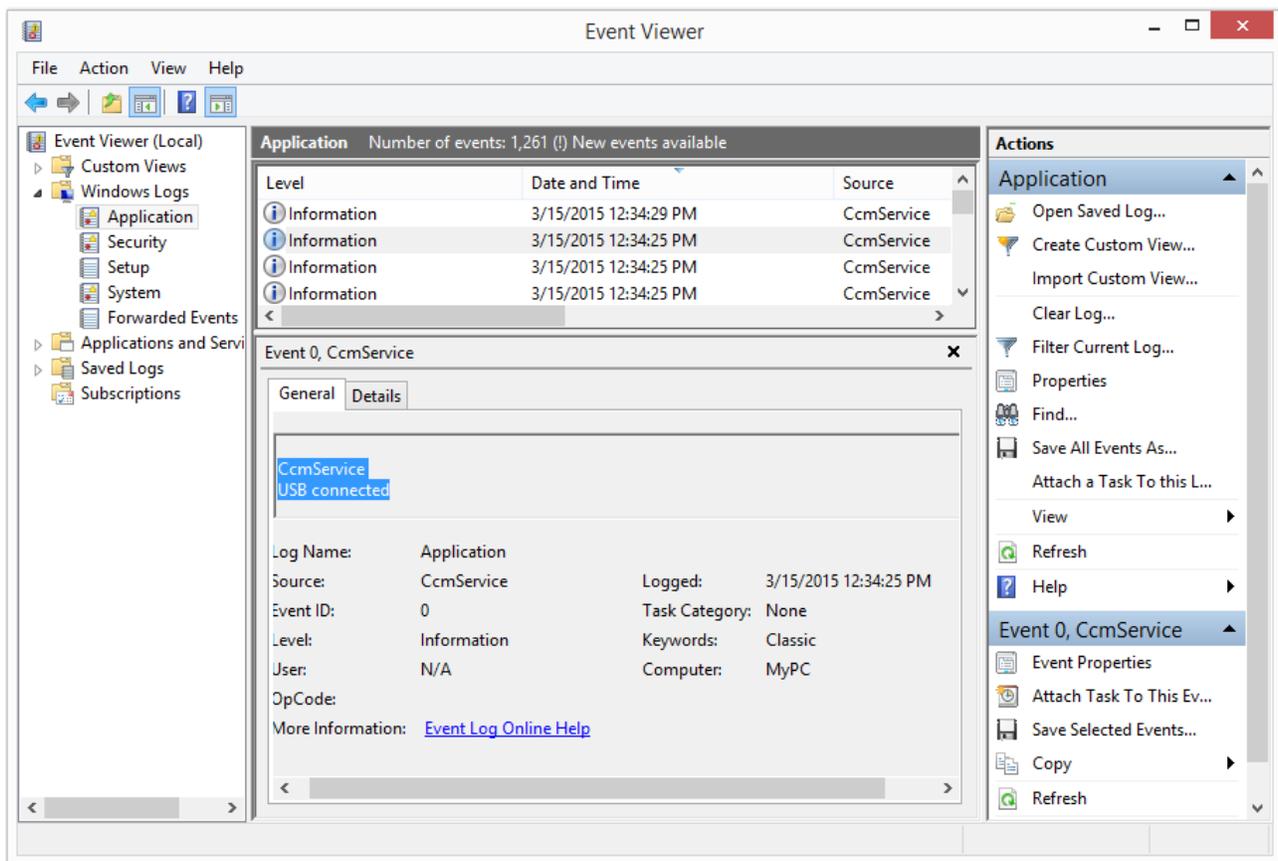


Selecting an event in the shows the event data below. In this case the message is "USB connected". This is a normal event that will occur whenever the array is plugged into a USB port.

The normal events are:

-- when loading
Service stopped
Service started

-- when USB cable is plugged in
USB connected
CCM available
CCM configuration loaded

-- when USB cable is unplugged
USB disconnected


Any other CcmService event messages are errors. The "Level" column will show the event as an error. The messages may contain information that can help Signal Interface Group locate the cause of the error. Copy the full error text into an email and send to SIG. Please also include any other information that can help replicate the problem, such as: CcmAccess configuration settings, configuration XML file, programming environment, etc.

# Appendix B. Handling Precautions

Static control is required for handling all electronic equipment. The Microphone Array and Command and Control Module (CCM) PCBs are sensitive to static discharge because of the analog and digital components. To protect the boards, observe the following precautions:

- Do not touch any exposed connectors.
- Provide a chassis ground when possible, especially in environments where there is a high probability of static discharge.
- When transporting, make sure the array is wrapped in the conductive plastic bag that it was shipped with. If this is not available, shield the board by wrapping it completely in aluminum foil. Do not transport, ship, or store a board without suitable conductive shielding.

# Appendix C. Contact Information

For more information, contact:

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