acontis technologies GmbH

SOFTWARE

# EC-Master

## Swift Programming Interface

Version 3.2

**Edition: January 9, 2025**

# Contents

# 1 Introduction

The Swift Wrapper provides a Swift interface to use EC-Master, EC-Simulator and RAS Client/Server.

## 1.1 Requirements

Swift v5.9 and above

**MacOS (ARM64)**

- macOS Ventura 13.5 and above

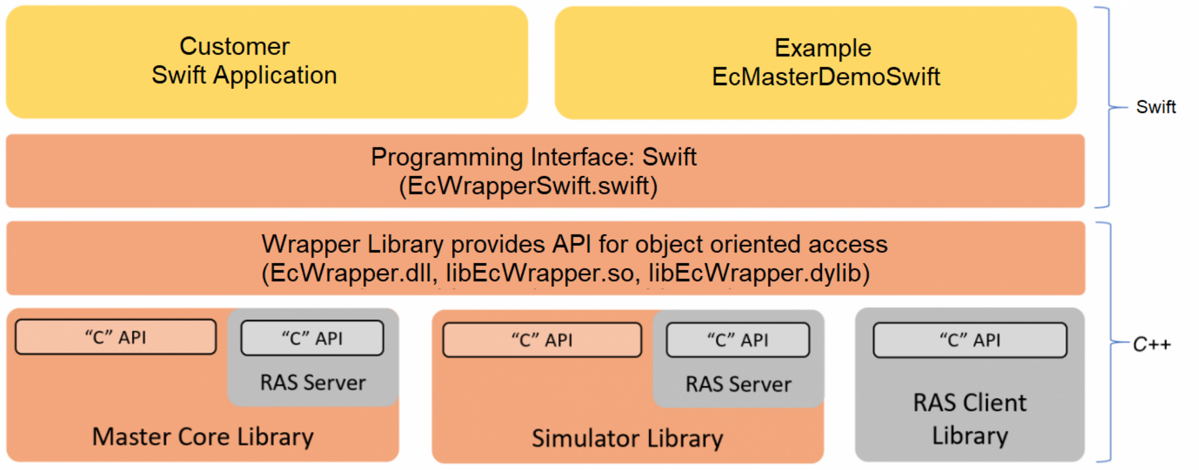
**Windows (x86/x64)**

- Microsoft Windows 10 and above
- Microsoft Visual C++ 2015 Runtime

**Linux (x86/x64/ARM)**

- Ubuntu 20.04 and above

## 1.2 Architecture



The architecture contains 4 basic layers:

**Customer Swift Application or our examples (EcMasterDemoSwift, …)**

- Demo application, written in Swift

**Programming Interface (EcWrapperSwift)**

- Provides an object oriented API written in Swift

**Wrapper Library (EcWrapper)**

- Native wrapper library, which provides API for object oriented access

**Native Libraries**

- Master Core Library
- Simulator Library
- RAS Client Library

# 2 Programmers Guide

## 2.1 Sample Code

The Swift demo application contains of 1 module:

**`EcMasterDemoSwift.swift:`**
Console demo application

## 2.2 Wrapper

### 2.2.1 Modules

The Swift Wrapper contains of 5 modules:

**`CEcWrapperSwift.swift`**

- **`class CEcWrapperSwift`**
  EC-Wrapper base class
- **`class CEcMasterSwift`**
  EC-Master
- **`class CEcMasterMbxGatewayClientSwift`**
  Mailbox Gateway Client for EC-Master
- **`class CEcMasterMbxGatewayServerSwift`**
  Mailbox Gateway Server for EC-Master
- **`class CEcSimulatorSwift`**
  EC-Simulator
- **`class CEcSimulatorRasServerSwift`**
  RAS Server for EC-Simulator
- **`class CEcRasClientSwift`**
  RAS Client for EC-Master / EC-Simulator

**`EcMotionSwift.swift`**

- **`class CEcMotionSwift`**
  EC-Motion interface

**`CEcWrapperSwiftTypes.swift`**
Swift types

**`CEcWrapper.swift`**
C Swift interface (internal)

**`CEcWrapperTypes.swift`**
C Swift types (internal)

### 2.2.2 Return code vs. exception handling

The most of all API functions returns a return code for error handling. This behaviour can be changed to throw an exception in error case by simply setting:

```
CEcWrapperSwift.EnableExceptionHandling = true // default is false
```

### 2.2.3 API with “out” or “ref” parameters

The Swift Wrapper API is based on C# code. C# supports `out` and `ref` keywords for parameters. This is not supported in Swift and is solved by simply submitting `&myNullableObject` or `&myObject` to those functions:

```
// This function has an "out" parameter "oSbStatus"
func GetScanBusStatus(oSbStatus: inout DN_EC_T_SB_STATUS_NTFY_DESC?) -> ECError {
    // ...
    return
}

// Create "out" parameter
var oStatus: DN_EC_T_SB_STATUS_NTFY_DESC?
// Call function
SwiftWrapper.GetScanBusStatus(oSbStatus: &oStatus)
// Now, the "oStatus" object can be used
print(oStatus!.dwResultCode)
```

## 2.3 Console Demo

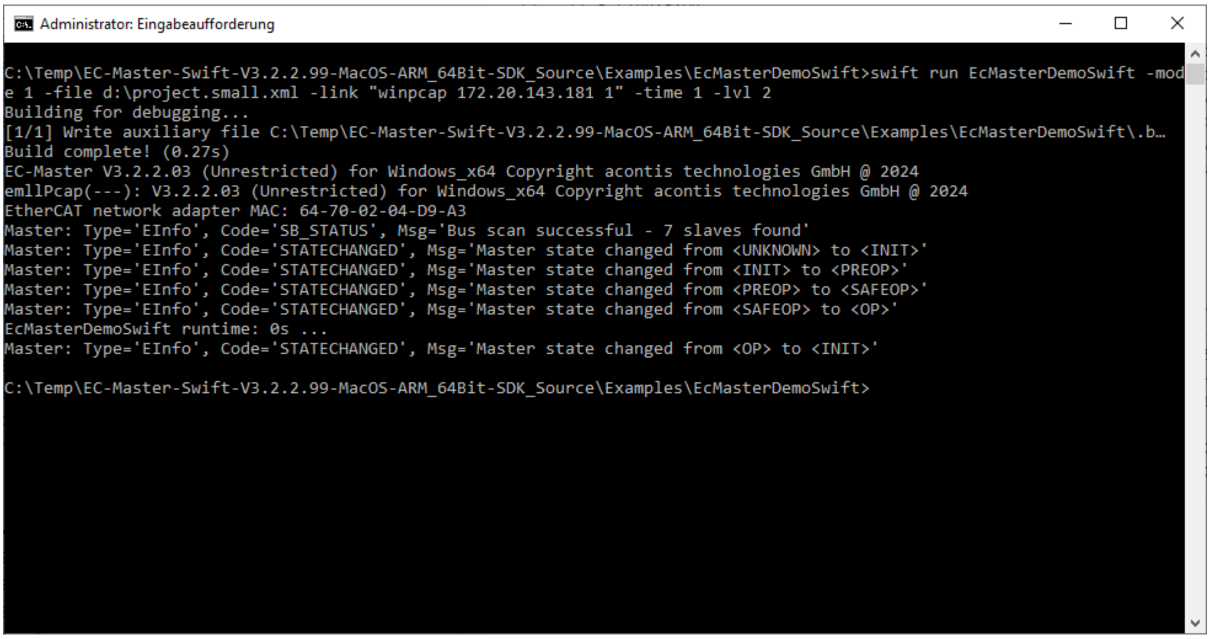
### 2.3.1 Windows

**Open Windows Console Window, setup the environment and run the demo in the specific mode**

```
cd C:\Temp\EC-Master-Swift-V3.2.2.01-02-MacOS-ARM_64Bit-SDK_Source\Examples\
↪EcMasterDemoSwift
set PATH=C:\Temp\V3.2.2.01-Windows-x86_64Bit\EC-Master-Windows-x86_64Bit\Bin\
↪Windows\x64;%PATH%
set ECWRAPPERSWIFT_INSTALLDIR=C:\Temp\V3.2.2.01-Windows-x86_64Bit\EC-Master-
↪Windows-x86_64Bit\Bin\Windows\x64\

// Master
swift run EcMasterDemoSwift -mode 1 -file d:\project.xml -link "winpcap 172.20.
↪143.181 1" -time 1
// Master+NDIS
swift run EcMasterDemoSwift -mode 1 -file d:\project.xml -link "ndis 172.20.
↪143.181 1" -time 1
// Master+RAS
swift run EcMasterDemoSwift -mode 1 -file d:\project.xml -link "winpcap 172.20.
↪143.181 1" -port 6000 -time 0
// Simulator
swift run EcMasterDemoSwift -mode 1 -file d:\project.xml -link "simulator d:\
↪project.xml 1 1" -time 1
// RAS-Client
swift run EcMasterDemoSwift -mode 2 -rem 127.0.0.1 -time 1
// Motion+Sim
swift run EcMasterDemoSwift -mode 1 -file d:\motion.xml -link "simulator d:\
↪motion.xml 1 1" -motion 1001 -port 6000 -time 0
```

**… and the demo is running.**



```
C:\Temp\EC-Master-Swift-V3.2.2.99-MacOS-ARM_64Bit-SDK_Source\Examples\EcMasterDemoSwift>swift run EcMasterDemoSwift -mod
e 1 -file d:\project.small.xml -link "winpcap 172.20.143.181 1" -time 1 -lvl 2
Building for debugging...
[1/1] Write auxiliary file C:\Temp\EC-Master-Swift-V3.2.2.99-MacOS-ARM_64Bit-SDK_Source\Examples\EcMasterDemoSwift\.b…
Build complete! (0.27s)
EC-Master V3.2.2.03 (Unrestricted) for Windows_x64 Copyright acontis technologies GmbH @ 2024
emllPcap(---): V3.2.2.03 (Unrestricted) for Windows_x64 Copyright acontis technologies GmbH @ 2024
EtherCAT network adapter MAC: 64-70-02-04-D9-A3
Master: Type='EInfo', Code='SB_STATUS', Msg='Bus scan successful - 7 slaves found'
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <UNKNOWN> to <INIT>'
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <INIT> to <PREOP>'
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <PREOP> to <SAFEOP>'
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <SAFEOP> to <OP>'
EcMasterDemoSwift runtime: 0s ...
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <OP> to <INIT>'

C:\Temp\EC-Master-Swift-V3.2.2.99-MacOS-ARM_64Bit-SDK_Source\Examples\EcMasterDemoSwift>
```

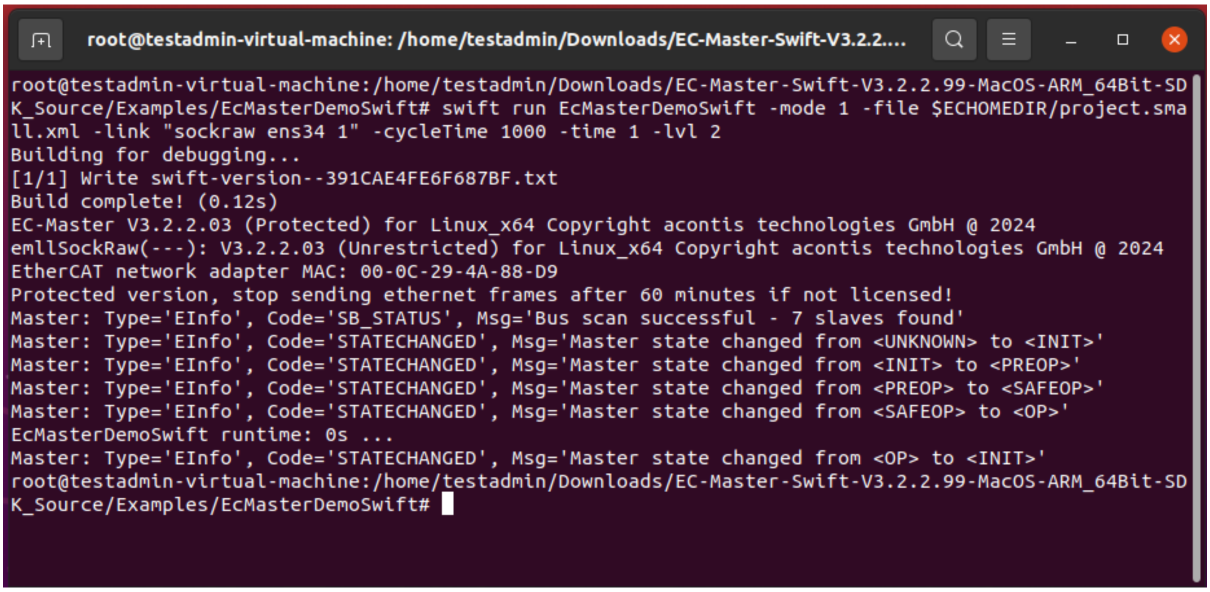
## 2.3.2 Linux

**Open Terminal, setup the environment and run the demo in the specific mode**

```
sudo -s // optional: required for sockraw link layer
cd /home/testadmin/Downloads/EC-Master-Swift-V3.2.2.01-02-MacOS-ARM_64Bit-SDK_
↪Source/Examples/EcMasterDemoSwift
export PATH=/home/testadmin/Downloads/swift-5.10.1-RELEASE-ubuntu20.04/usr/bin:
↪"${PATH}"
export PATH=/home/testadmin/Downloads/V3.2.2.01-Linux-x86_64Bit/EC-Master-V3.2.
↪2.01-Linux-x86_64Bit-Eval/Bin/Linux/x64:"${PATH}"
export LD_LIBRARY_PATH=/home/testadmin/Downloads/V3.2.2.01-Linux-x86_64Bit/EC-
↪Master-V3.2.2.01-Linux-x86_64Bit-Eval/Bin/Linux/x64:$LD_LIBRARY_PATH
export ECWRAPPERSWIFT_INSTALLDIR=/home/testadmin/Downloads/V3.2.2.01-Linux-x86_
↪64Bit/EC-Master-V3.2.2.01-Linux-x86_64Bit-Eval/Bin/Linux/x64/

// Master
swift run EcMasterDemoSwift -mode 1 -file /tmp/project.xml -link "sockraw␣
↪ens34 1" -time 1
// Simulator
swift run EcMasterDemoSwift -mode 1 -file /tmp/project.xml -link "simulator /
↪tmp/project.xml 1 1" -time 1
// RAS-Client
swift run EcMasterDemoSwift -mode 2 -rem 172.17.5.112 -time 1
```

**… and the demo is running.**



root@testadmin-virtual-machine: /home/testadmin/Downloads/EC-Master-Swift-V3.2.2....

```
root@testadmin-virtual-machine:/home/testadmin/Downloads/EC-Master-Swift-V3.2.2.99-MacOS-ARM_64Bit-SD
K_Source/Examples/EcMasterDemoSwift# swift run EcMasterDemoSwift -mode 1 -file $ECHOMEDIR/project.sma
ll.xml -link "sockraw ens34 1" -cycleTime 1000 -time 1 -lvl 2
Building for debugging...
[1/1] Write swift-version--391CAE4FE6F687BF.txt
Build complete! (0.12s)
EC-Master V3.2.2.03 (Protected) for Linux_x64 Copyright acontis technologies GmbH @ 2024
emllSockRaw(---): V3.2.2.03 (Unrestricted) for Linux_x64 Copyright acontis technologies GmbH @ 2024
EtherCAT network adapter MAC: 00-0C-29-4A-88-D9
Protected version, stop sending ethernet frames after 60 minutes if not licensed!
Master: Type='EInfo', Code='SB_STATUS', Msg='Bus scan successful - 7 slaves found'
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <UNKNOWN> to <INIT>'
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <INIT> to <PREOP>'
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <PREOP> to <SAFEOP>'
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <SAFEOP> to <OP>'
EcMasterDemoSwift runtime: 0s ...
Master: Type='EInfo', Code='STATECHANGED', Msg='Master state changed from <OP> to <INIT>'
root@testadmin-virtual-machine:/home/testadmin/Downloads/EC-Master-Swift-V3.2.2.99-MacOS-ARM_64Bit-SD
K_Source/Examples/EcMasterDemoSwift# 
```

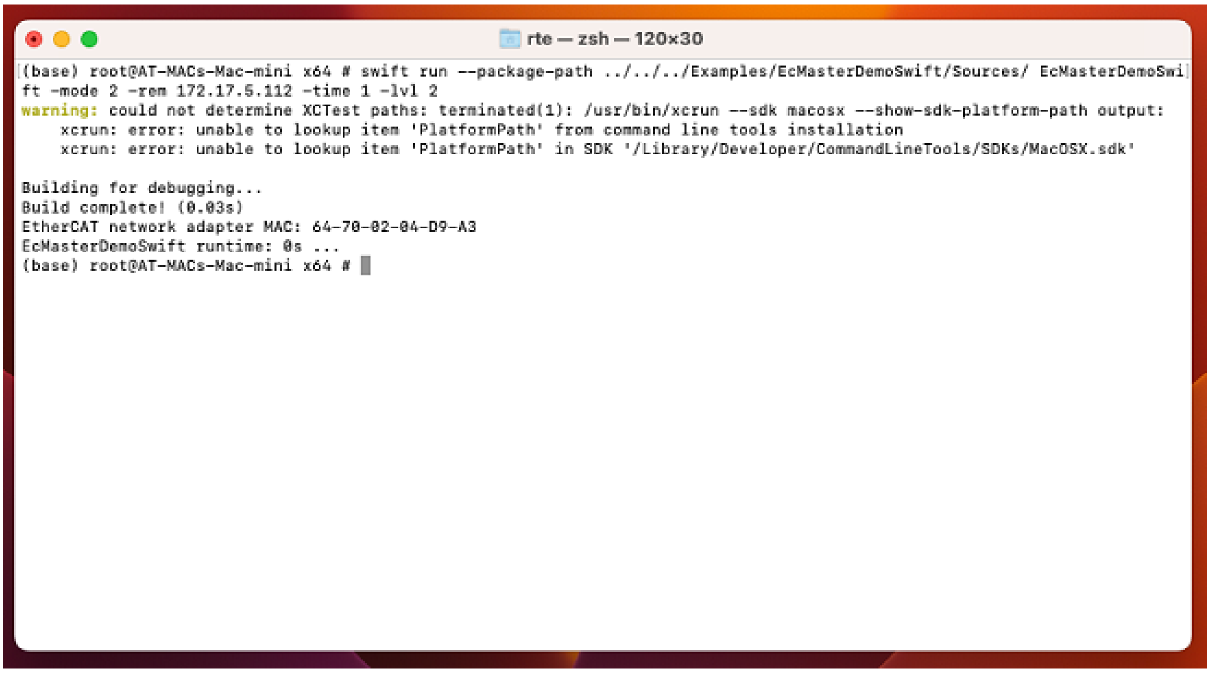
### 2.3.3 MacOS

**Open Terminal, setup the environment and run the demo in the specific mode**

```
sudo -s // optional: required for winpcap link layer, to avoid error message
↪"(cannot open BPF device) /dev/bpf0: Permission denied"
cd /Users/rte/Desktop/USERS/MGR/Test/EC-Master-Swift-V3.2.2.01-02-MacOS-ARM_
↪64Bit-SDK_Source/Bin/MacOS/x64 // Run from here with --package-path, because␣
↪otherwise link layers could not be found
export PATH=/Users/rte/Desktop/USERS/MGR/Test/EC-Master-Swift-V3.2.2.01-02-
↪MacOS-ARM_64Bit-SDK_Source/Bin/MacOS/x64:"${PATH}"
export DYLD_LIBRARY_PATH=/Users/rte/Desktop/USERS/MGR/Test/EC-Master-Swift-V3.
↪2.2.01-02-MacOS-ARM_64Bit-SDK_Source/Bin/MacOS/x64:$DYLD_LIBRARY_PATH
export ECWRAPPERSWIFT_INSTALLDIR=/Users/rte/Desktop/USERS/MGR/Test/EC-Master-
↪Swift-V3.2.2.01-02-MacOS-ARM_64Bit-SDK_Source/Bin/MacOS/x64/
export ECWRAPPERSWIFT_WRAPPERDIR=/Users/rte/Desktop/USERS/MGR/Test/EC-Master-
↪Swift-V3.2.2.01-02-MacOS-ARM_64Bit-SDK_Source/Bin/MacOS/x64/

// Master
swift run --package-path ../../../Examples/EcMasterDemoSwift/Sources/␣
↪EcMasterDemoSwift -mode 1 -file /Users/rte/Desktop/USERS/MGR/project.xml -
↪link "winpcap en7 1" -time 1
// Master+IP
swift run --package-path ../../../Examples/EcMasterDemoSwift/Sources/␣
↪EcMasterDemoSwift -mode 1 -file /Users/rte/Desktop/USERS/MGR/project.xml -
↪link "winpcap 192.168.0.1 1" -time 1
// Simulator
swift run --package-path ../../../Examples/EcMasterDemoSwift/Sources/␣
↪EcMasterDemoSwift -mode 1 -file /Users/rte/Desktop/USERS/MGR/project.xml -
↪link "simulator /Users/rte/Desktop/USERS/MGR/project.xml 1 1" -time 1
// RAS-Client
swift run --package-path ../../../Examples/EcMasterDemoSwift/Sources/␣
↪EcMasterDemoSwift -mode 2 -rem 172.17.5.112 -time 1
```

**… and the demo is running.**



```
(base) root@AT-MACs-Mac-mini x64 # swift run --package-path ../../../Examples/EcMasterDemoSwift/Sources/ EcMasterDemoSwi
ft -mode 2 -rem 172.17.5.112 -time 1 -lvl 2
warning: could not determine XCTest paths: terminated(1): /usr/bin/xcrun --sdk macosx --show-sdk-platform-path output:
    xcrun: error: unable to lookup item 'PlatformPath' from command line tools installation
    xcrun: error: unable to lookup item 'PlatformPath' in SDK '/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk'

Building for debugging...
Build complete! (0.03s)
EtherCAT network adapter MAC: 64-70-02-04-D9-A3
EcMasterDemoSwift runtime: 0s ...
(base) root@AT-MACs-Mac-mini x64 #
```

# 3 FAQ

I installed Swift and the demo crashes with strange errors. What can I do?

> This might be a problem of mixing x86 with x64 binaries. Verify that if you have installed the Swift runtime for x64 bit, please install also EC-Master for x64 bit.