



FactoryTalk[®] Logix Echo

Version 3 Capability Summary

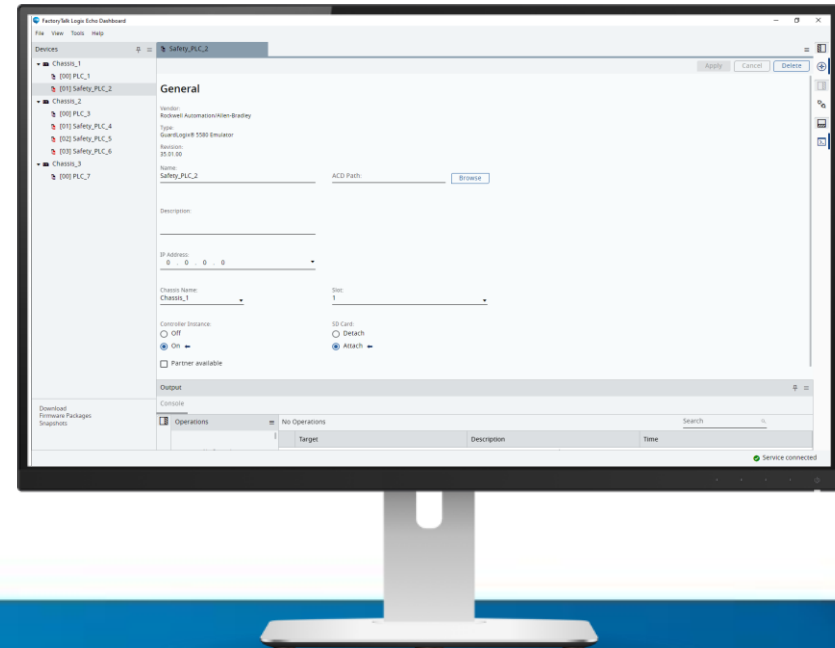
expanding **human possibility**[®]



PUBLIC



Logix Echo



Emulate ControlLogix® & GuardLogix® 5580, CompactLogix™ & Compact GuardLogix® 5380

- Fully test your standard and safety control code in an isolated, virtual environment
- Execute controller project configured as SIL2/PLD and SIL3/PLC as designed without modifications
- Generate the Snapshots and restore for the training purposes
- Improved check-in/check-out activation procedure

Architecture & Connectivity

- Run multiple controllers in multiple chassis on one node
- Produce/Consume and MSGs between emulated controllers
- Interface with high fidelity machine & process simulators and Operator Training Simulators (OTS) using **FactoryTalk® Logix Echo SDK**

CIP Motion Axis Simulation

- 5580 ControlLogix® & GuardLogix® Standard and Safety task motion logic and CIP Motion drive connection emulation
- Low Fidelity CIP Motion axis/drive simulation model for Kinetix®, PowerFlex® CIP Motion drives and 5730 iTRAK®

Apply Same Project to Physical or Emulated Controller

Same Project File

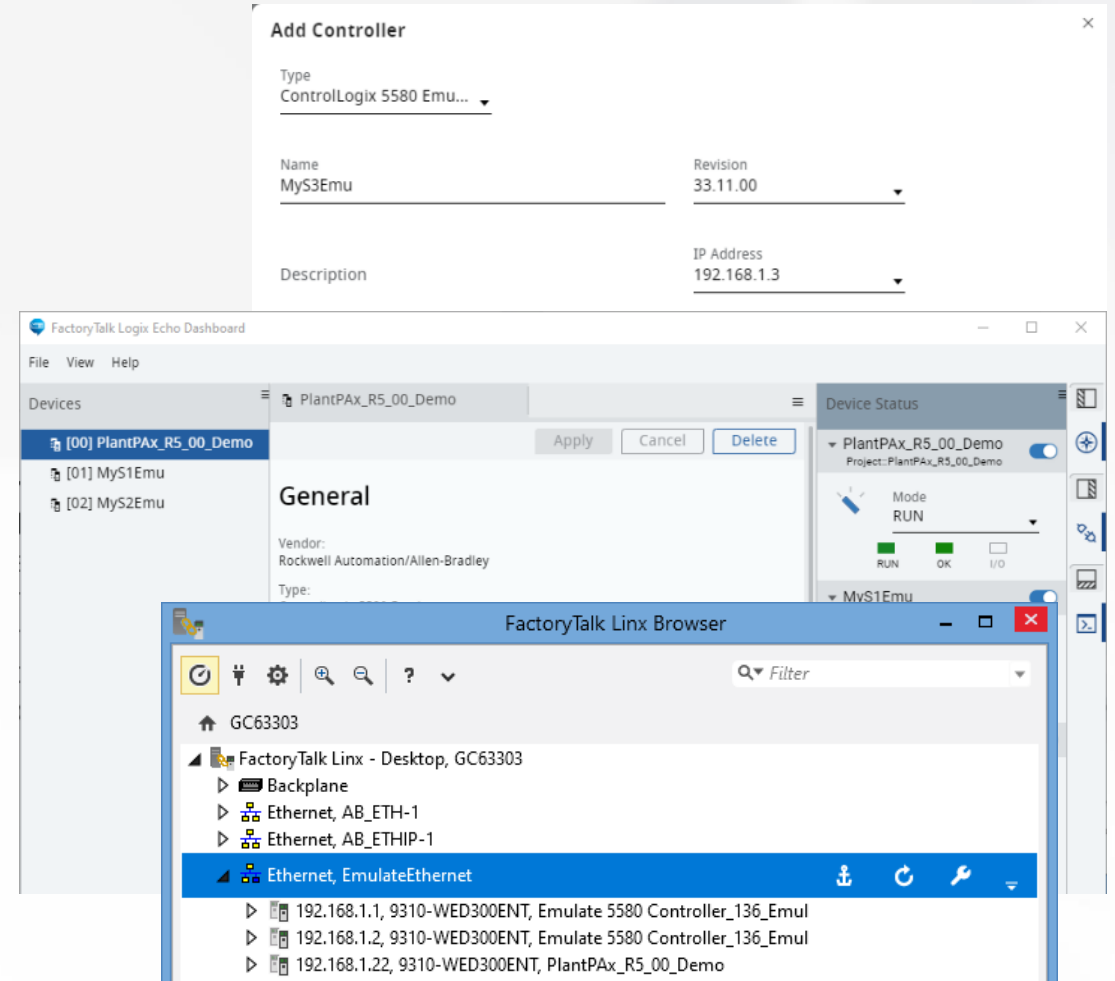
No changes to the project file required. The same project file developed for the physical controller will download to the emulator. The I/O tree will be maintained, all languages and instructions supported.



Access is Similar to a Physical Controller

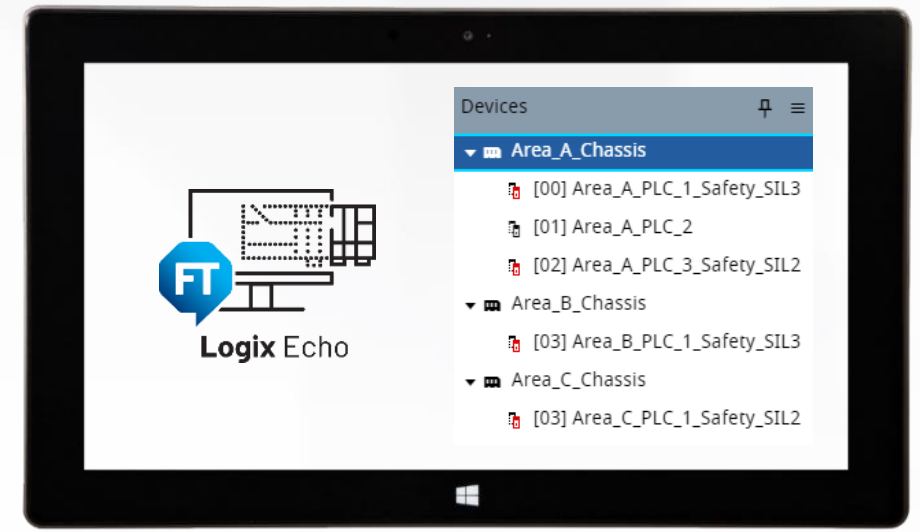
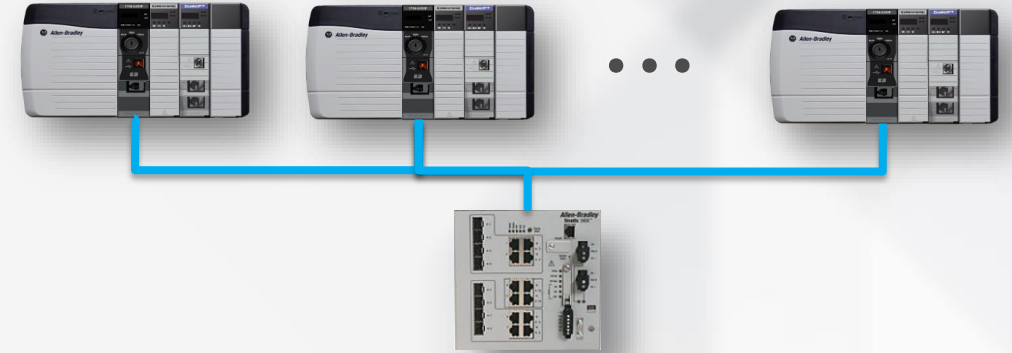
Configuring an emulated controller is fast

- Get the corresponding emulator firmware kit from the PCDC
- Create an emulated controller instance with appropriate firmware revision and IP address
- Configured controllers appear in FactoryTalk® Linx software
- Create up to 17 emulated controllers in one emulated chassis



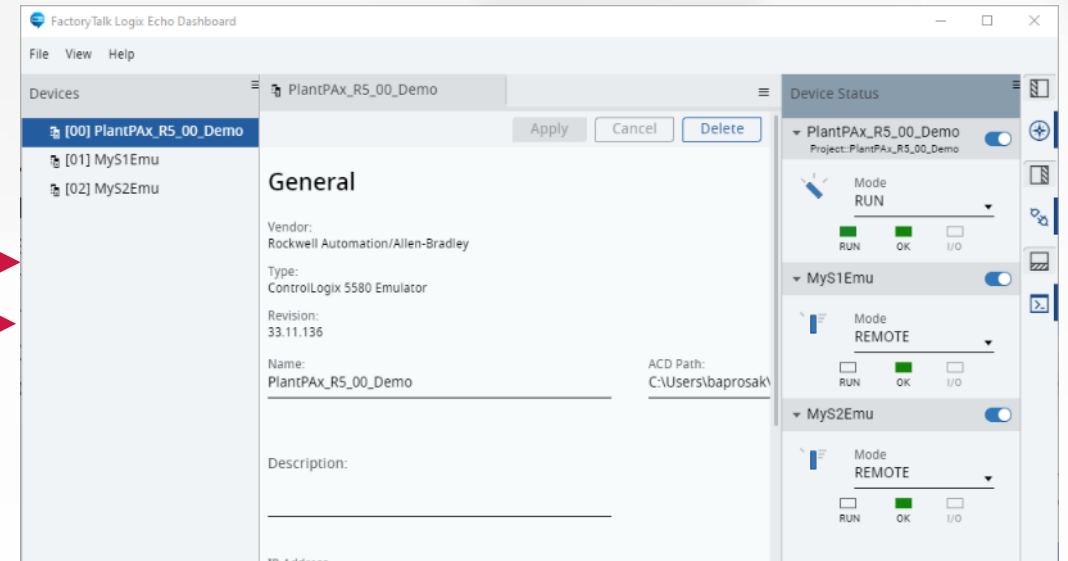
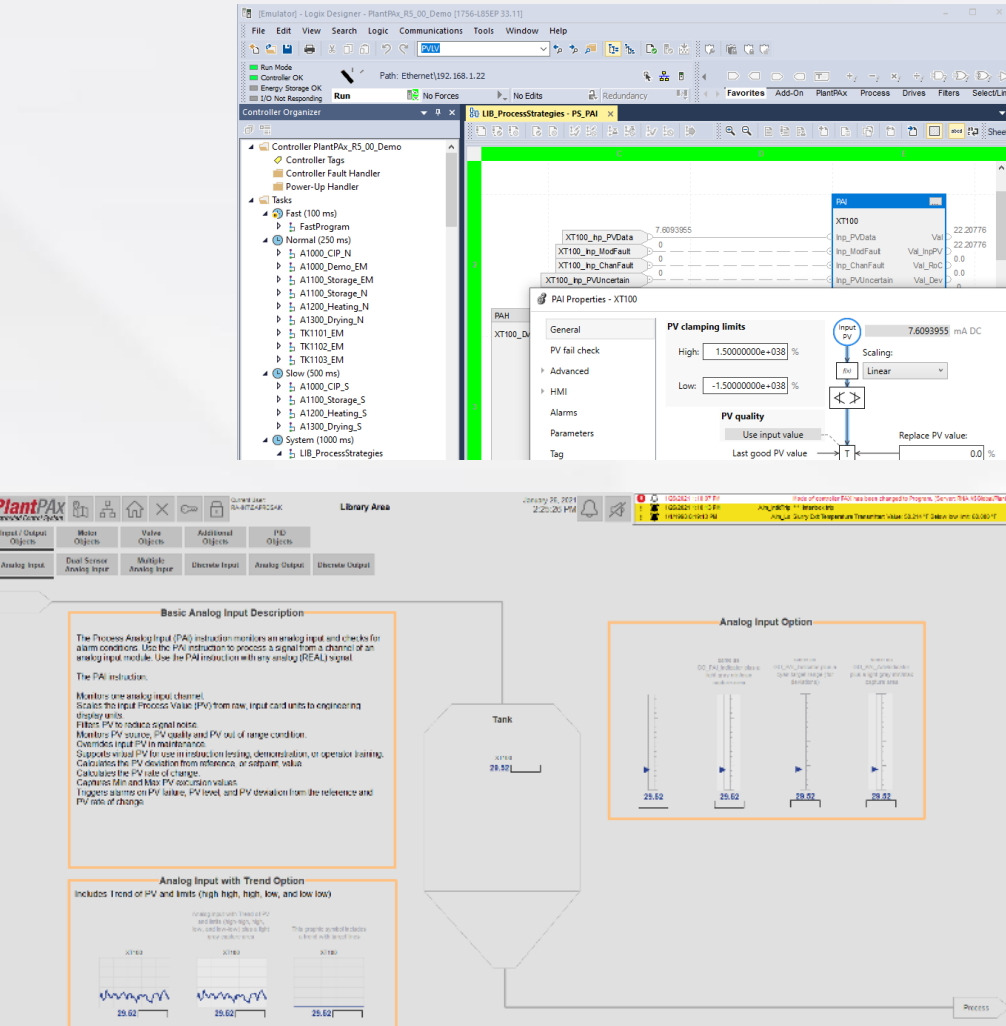
Emulate multi-chassis systems

- Create Multiple chassis within one FactoryTalk® Logix Echo installation
- Emulate more complex distributed control systems
- Exceed the limit of 17 emulated controller instances
- Manage the emulated control system architecture via FactoryTalk® Logix Echo Dashboard and Service API
- Create, restore and manage the complex control systems snapshots



Simulate Control Code and HMI Interaction All from a Single Workstation or Distributed

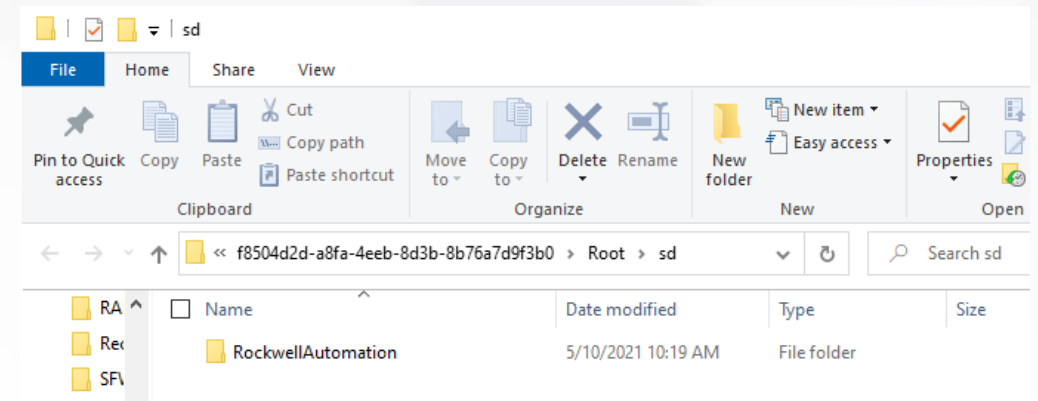
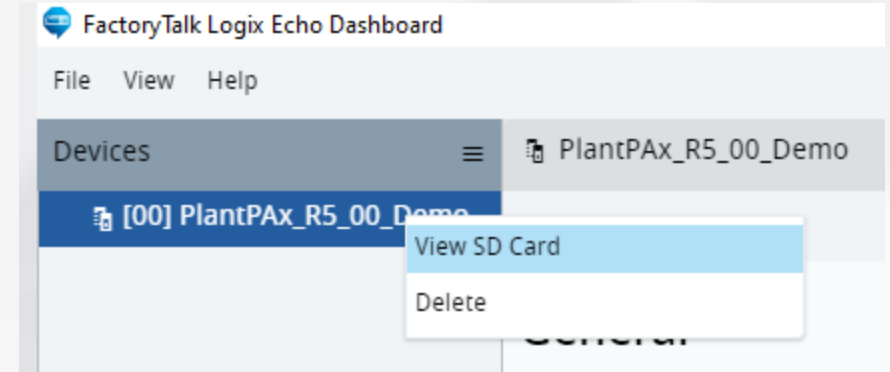
Step 1: create Logix application and run in Studio 5000®
Logix Emulate™



Step 2: Existing HMI shortcut(s) will work provided the emulated controller is at the same IP as the physical controller

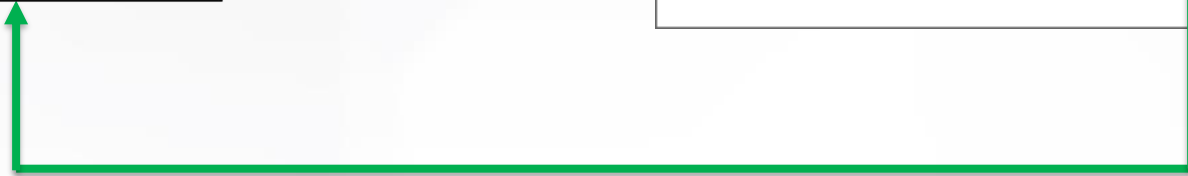
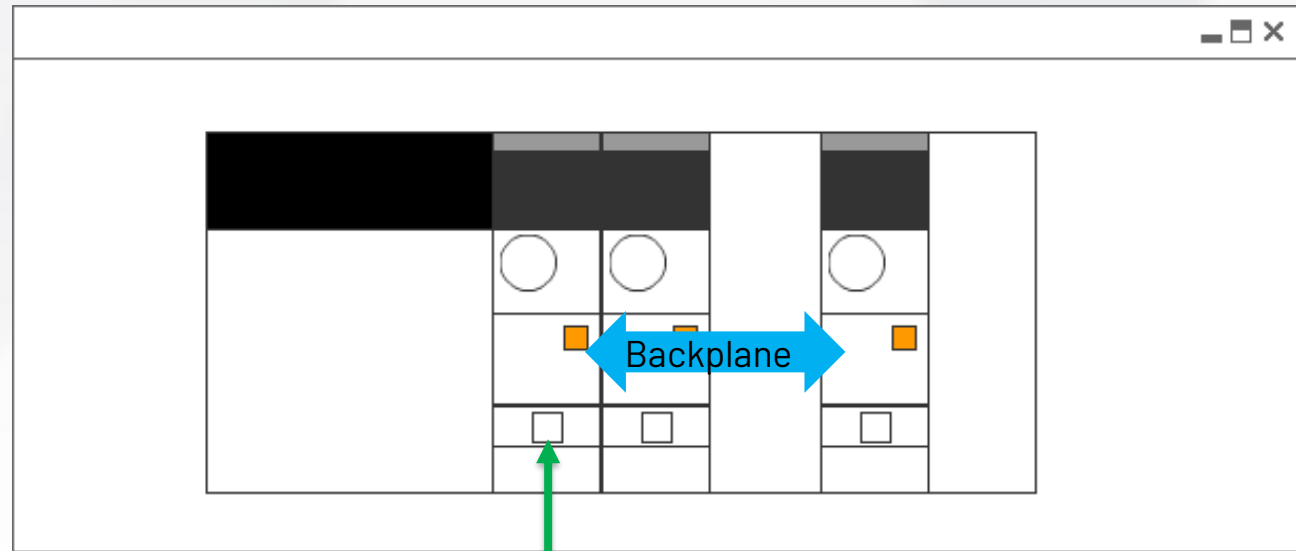
Support for SD Cards

- By default, a virtual SD card is attached to a controller (as a folder on your Windows directory)
- You can backup/restore projects, read/write data from the controller applications, log, just as you would with a physical SD card in the controller.
- Unlike the physical controller:
 - Firmware is not stored to the virtual SD
 - The content is stored unencrypted



Studio 5000 Logix Designer® to Emulator Instance

Studio 5000 Logix Designer® can download over Ethernet. It can also bridge through one emulator instance connected over Ethernet to another emulator instance through the emulated backplane.

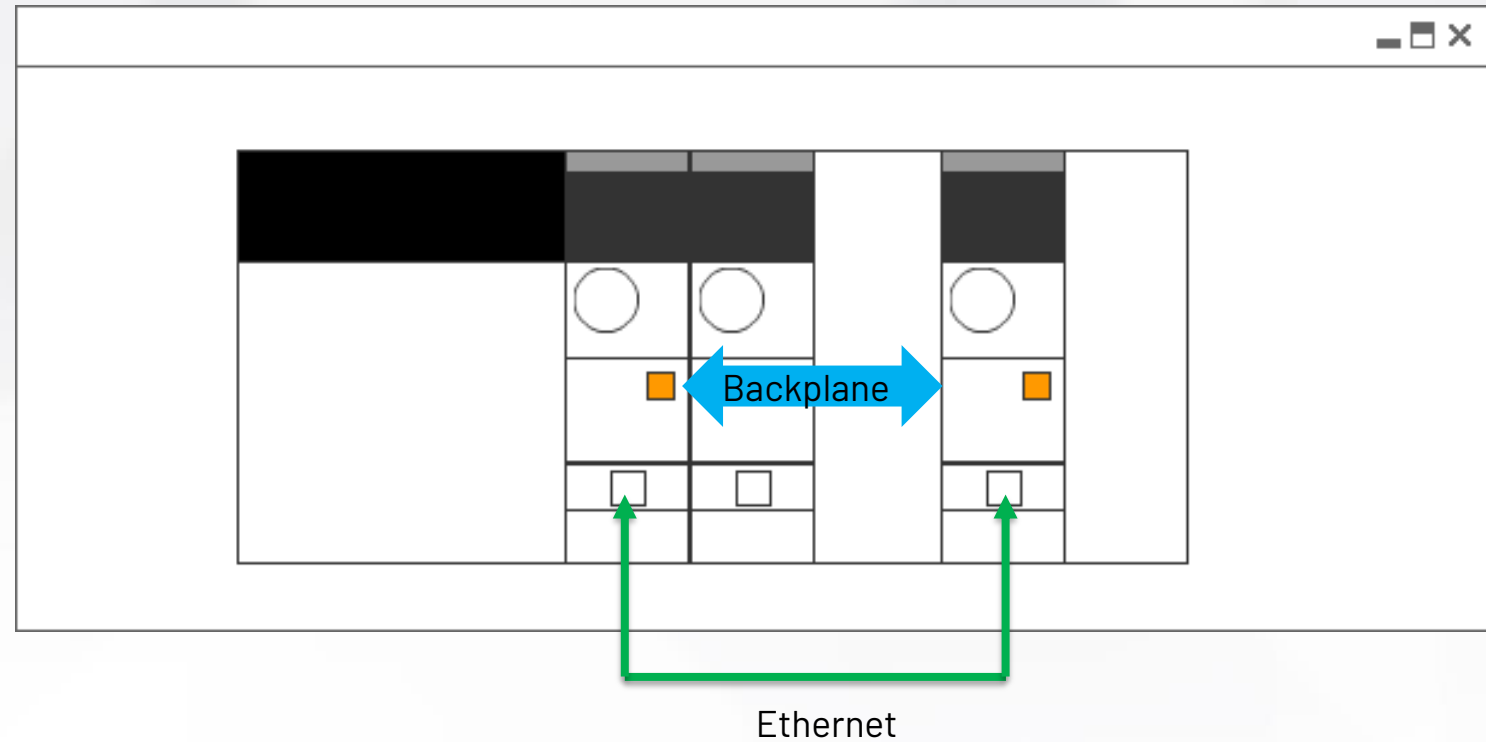


Ethernet

Emulator-2-Emulator Communications

Class 1 (Produce/Consume) or Class 3 (Messages) communication between emulator instances can be established across:

- The emulated backplane
- Ethernet using the EtherNet/IP protocol.



IP address Considerations

- Only one controller needs an IP address assigned (the rest of the controllers can be bridged to through the Ethernet connected controller, over the backplane)
- The dashboard will only present IP addresses that are configured on the workstation including the loopback address, reserved in Windows for testing, 127.0.0.1.
- After assigning 127.0.0.1 to an emulator, you can reassign the IP address to any loopback address (127.x.x.x) on the general properties pane of the controller.
- Alternatively, if you have administrative privileges, additional IP addresses can be assigned to your network adapters to support additional controllers on Ethernet.

Important

- Studio 5000 Logix Designer® will not allow you to use loopback addresses for the controller in the I/O tree, help to prevent you from using loopback addresses for Produce/Consume messages between emulators over Ethernet.

CPU – 2.2 GHz Intel Core i3 or faster processor:

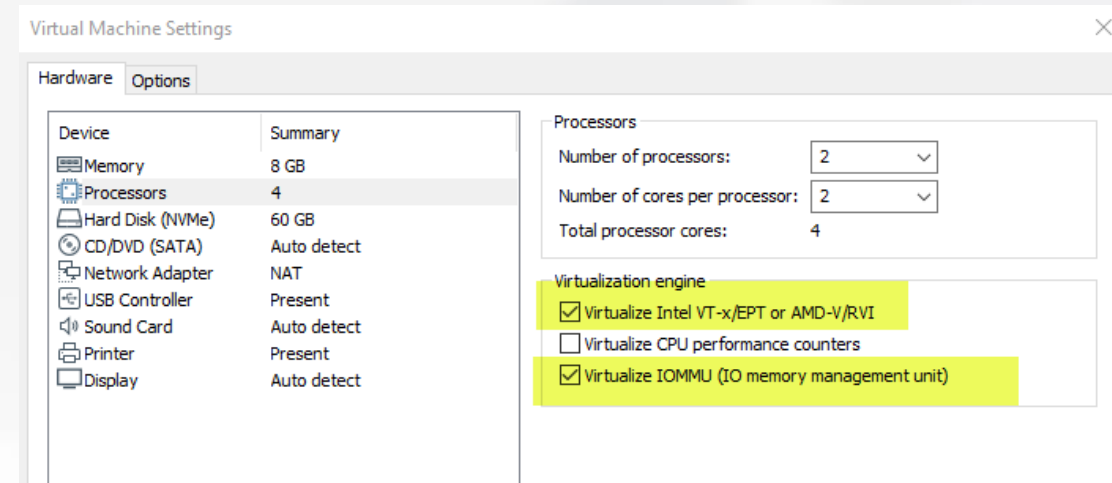
- At least one logical core for the OS
- At least two logical cores for the core FactoryTalk® Logix Echo application
- At least one logical core per emulated controller instance
- Additional logical cores dependent on additional software installed on workstation

Memory – at least 8GB:

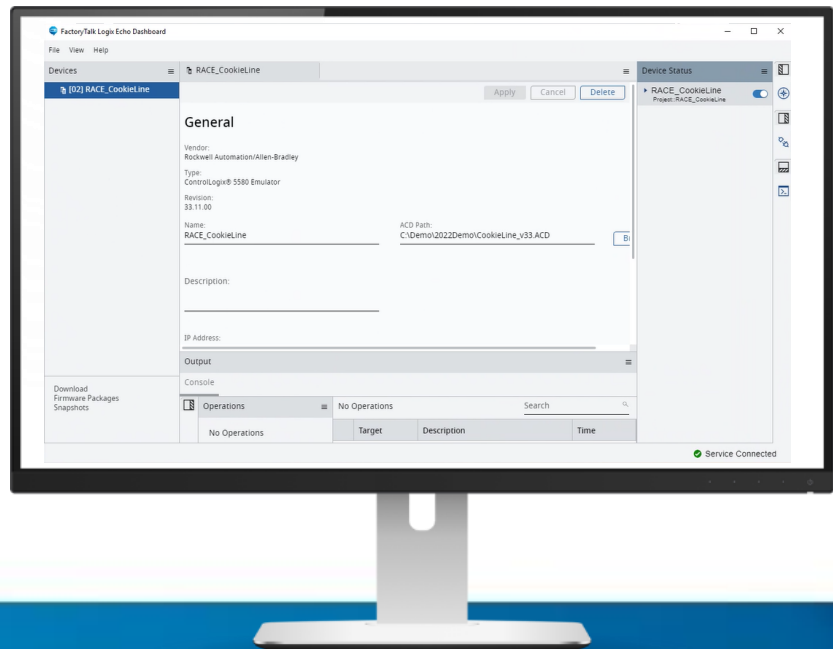
- 2GB for the base FactoryTalk® Logix Echo application
- 256MB – 1GB per emulated controller instance
- Additional memory for OS and other software applications

Virtual Machine Consideration

- Use Intel Virtualization Technology



FT Logix Echo



CompactLogix™ 5380 & Compact GuardLogix® 5380

- First emulator to support CompactLogix™
- Expands FactoryTalk® Logix Echo user base to exclusive CompactLogix™ or mixed controller systems
- Most accurate virtual representation of the hardware (emulation of dual ethernet ports)

CIP Motion Axis Simulation for Safety

- Expands testing to Safety code without project modifications
- Supports safety task motion logic
- Useful for control application development, operator training simulators (OTS), or testing and startups

Improved Usability

- Immediately save diagnostic files to known location for Rockwell Automation technical support
- Improved check-in/check-out activation procedure

Emulated CompactLogix™ & Compact GuardLogix® 5380s

CompactLogix™ 5380 Controllers

All controller family catalogs



Compact GuardLogix® 5380 Controllers

All controller family catalogs



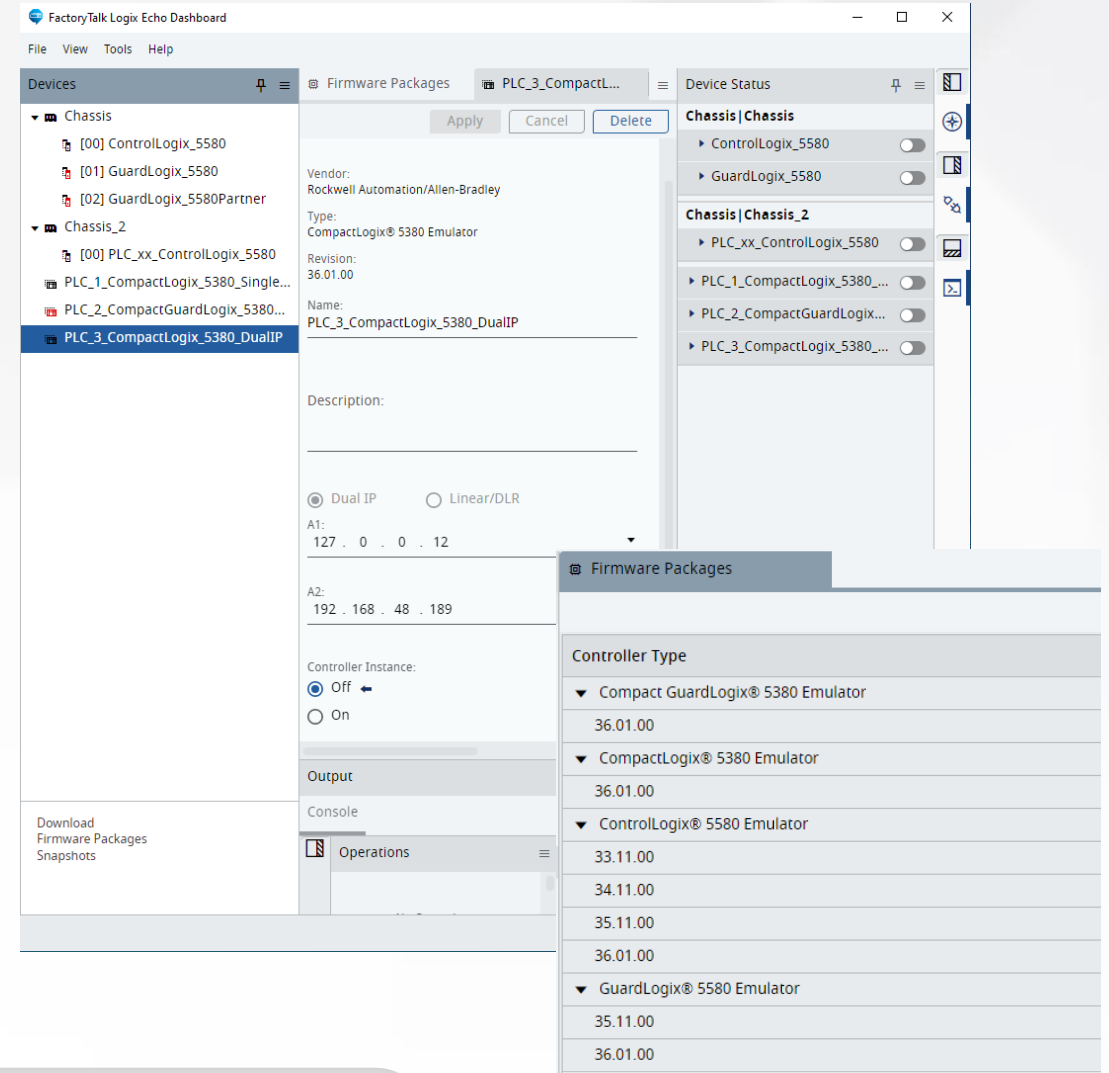
Logix Echo

Firmware version 36 or later

New emulated controller families

CompactLogix™ & Compact GuardLogix® 5380

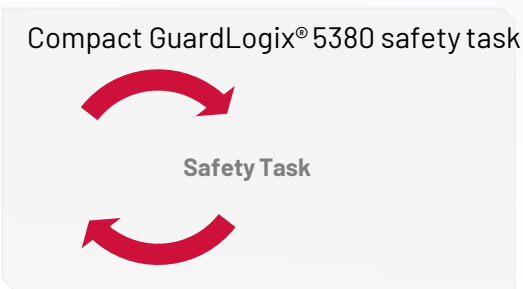
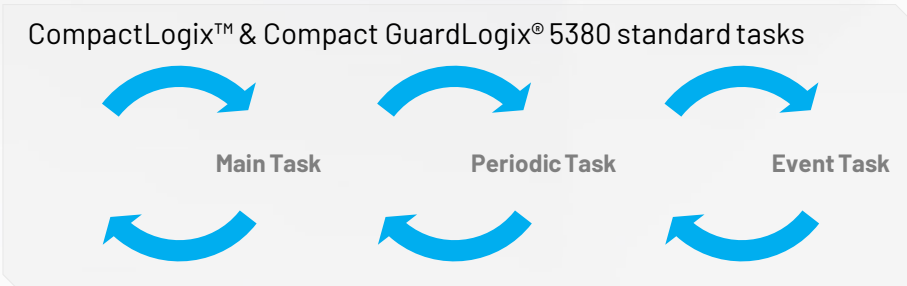
- Fully test your safety control code in a safe, virtual environment
- Execute controller project as designed without modifications. The I/O tree will be maintained, all languages, instructions and task types supported
- All features introduced in FactoryTalk® Logix Echo V1 & V2 apply to CompactLogix™ & Compact GuardLogix® Emulator
 - Virtual SD Card
 - Emulator to Emulator Ethernet communication (Class 0/1 & 3)
 - Snapshot – controller state save
 - Service and Controller API



New emulated controller families

Tasks Execution

- Emulation of both **standard** and **safety tasks**
- Safety instructions set execution within the safety task
- Safety Add-On instructions support



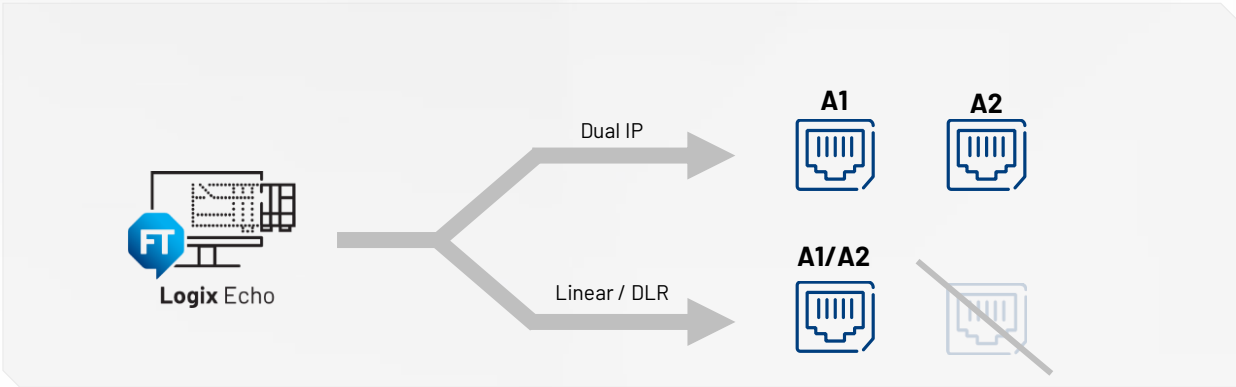
The screenshot shows the Logix Designer interface. The Controller Organizer on the left displays a tree view with the following structure:

- Controller CompactGuardLogix5380_Proj
 - Controller Tags
 - Controller Fault Handler
 - Power-Up Handler
 - Tasks
 - MainTask
 - MainProgram
 - SafetyTask (20 ms)
 - SafetyProgram (selected)
 - Unscheduled
 - Motion Groups
 - Ungrouped Axes
 - Alarm Manager
 - Assets
 - Logical Model
 - I/O Configuration
 - 5069 Backplane
 - [0] 5069-L350ERMS3 CompactGuardLogix5380_Proj
 - A1, Ethernet
 - 5069-L350ERMS3 CompactGuardLogix5380_Proj
 - A2, Ethernet
 - 5069-L350ERMS3 CompactGuardLogix5380_Proj

New emulated controller families

Ethernet Ports Configuration

- Ethernet ports modes **Dual IP** and **Linear/DLR** configuration
- The actual **DLR** (*Device Level Ring*) topology not supported
- Configuration of both IP addresses when being in **Dual IP** mode and single in **Linear/DLR**



Controller Properties - CompactGuardLogix5380_Proj

Port	Enable	Link Status	Auto-Negotiate	Speed		Duplex		Port Diagnostics
				Selected	Current	Selected	Current	
A1	<input checked="" type="checkbox"/>		<input type="checkbox"/>					...
A2	<input checked="" type="checkbox"/>		<input type="checkbox"/>					...

General

Vendor: Rockwell Automation/Allen-Bradley

Type: CompactLogix® 5380 Emulator

Revision: 36.01.00

Name: PLC_3_CompactLogix_5380_DualIP

Description:

Add controller

Type: CompactLogix® 5380 Emula...

Name: PLC_xx Revision: 36.01.00

Description:

Dual IP Linear/DLR

A1: 127 . 0 . 0 . 1

A2: 0 . 0 . 0 . 0

Add Cancel

Dual IP Linear/DLR

A1: 127 . 0 . 0 . 12

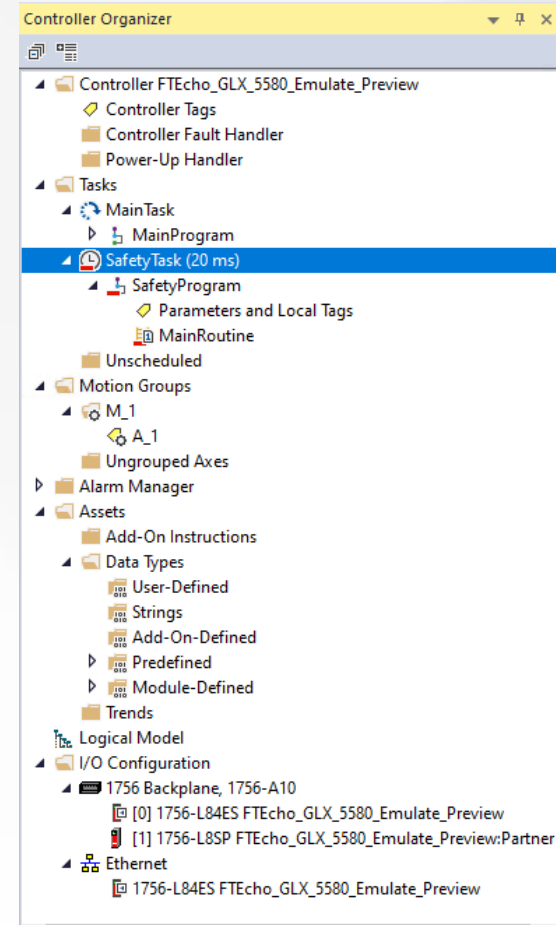
A2: 192 . 168 . 48 . 189

Controller Instance: Off On

CIP Axis Simulation improvement

Axis Test Mode for Safety

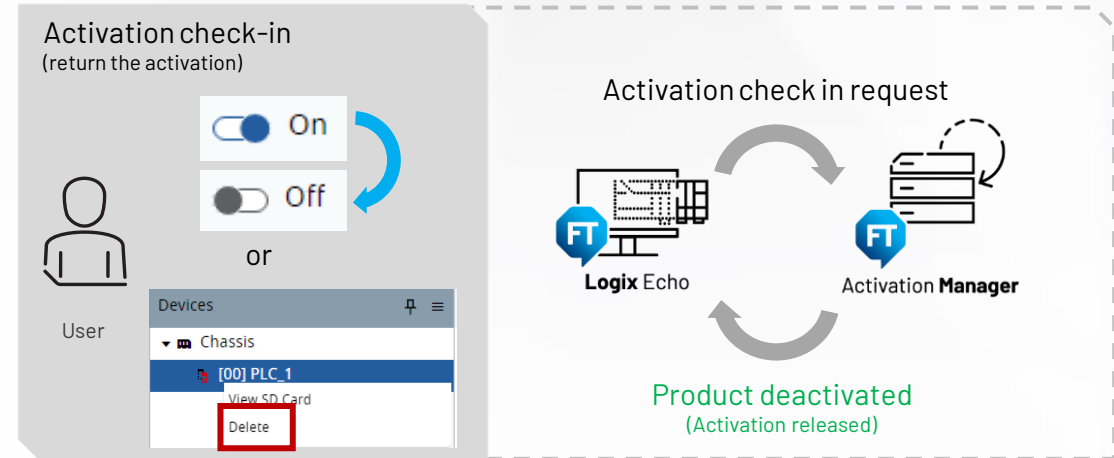
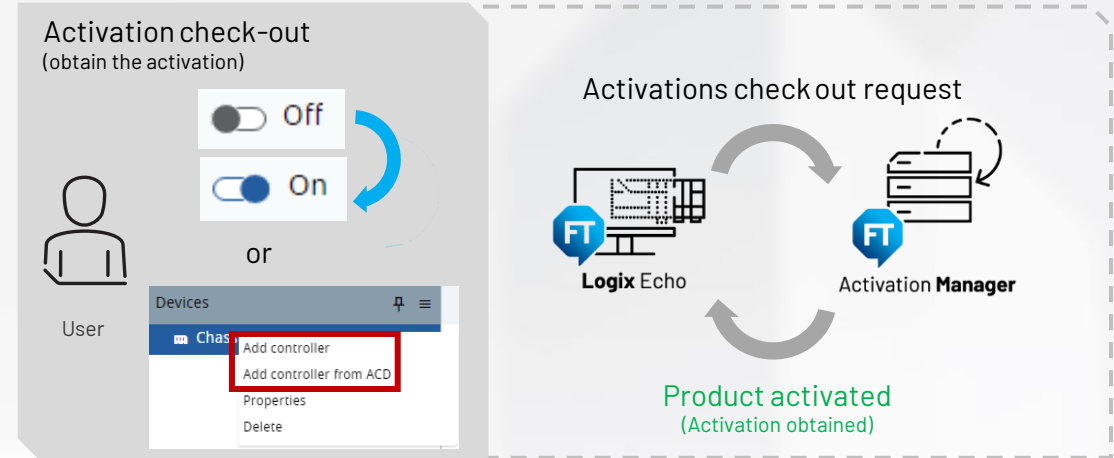
- Use the CIP Axis Simulation to validate your safety motion control code, without access to the physical drives
- New safety-related capabilities added:
 - CIP Motion drive safety connection, safety feedback, safety attributes, pass-through safety parameters
 - Safety instructions set execution within the safety task (Motion drive safety instructions)
 - Safety Add-On instructions support



Product activation workflow improvement

Controller status-based license management

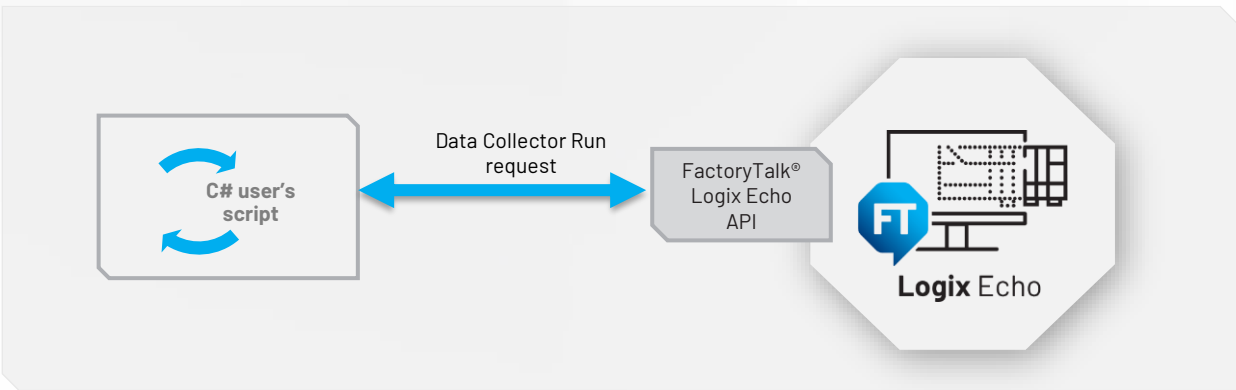
- **Turn On or Add** at least one emulated controller instance to **check out** the license from FactoryTalk® Activation Server
- Return (**check-in**) the unused activation by **Turning Off or Deleting** all emulated controller instances



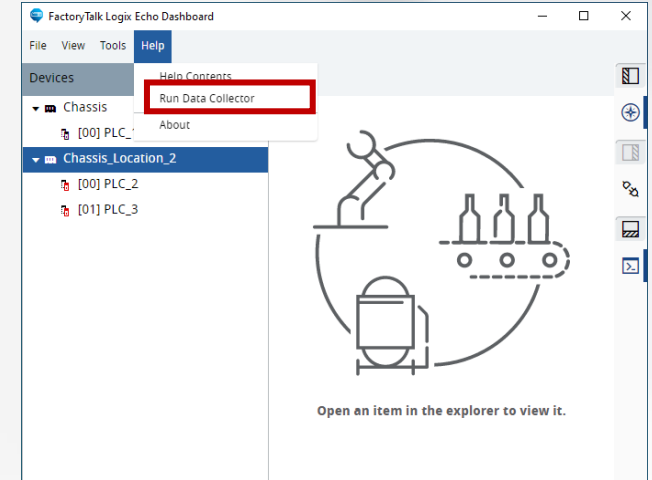
Simplified diagnostic data collection

Diagnostics Data Collector interfaces

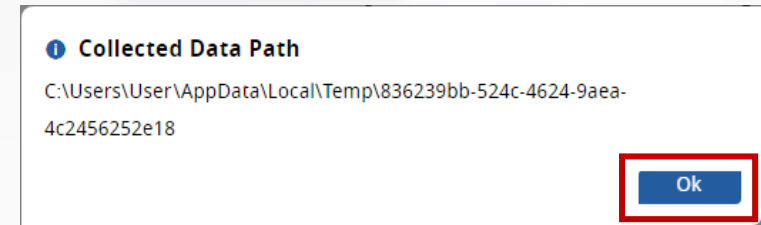
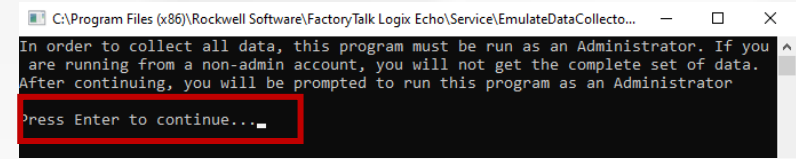
- Use the FactoryTalk® Logix Echo **Dashboard** to collect the diagnostic logs and let us help you to solve your problem in three simple steps
- Run the Data Collector directly from your C# client application using the new **FactoryTalk® Logix Echo SDK function**



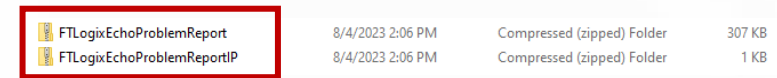
1
Trigger the Data Collector from FactoryTalk® Logix Echo Dashboard



2
Confirm your consent



3
Share with us the log files to review your problem



FactoryTalk® Logix Echo API

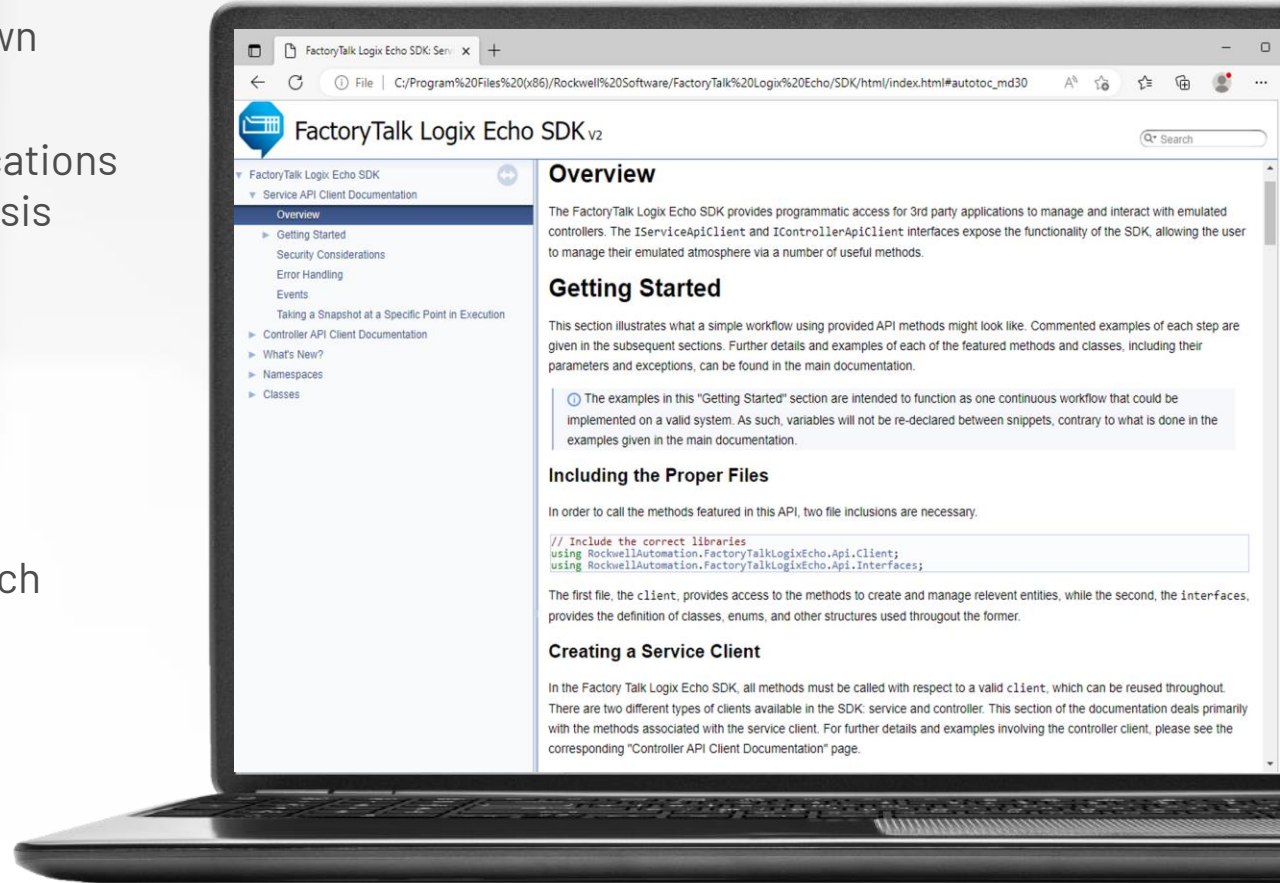
A programmatic interface for Logix controller emulation



- Integrate all FactoryTalk® Logix Echo functionality into your own software application
- Use the SDK and an API to build the **C# based 32/64-bit** applications to connect directly to controllers for simulation and data analysis

The SDK documentation kit contains:

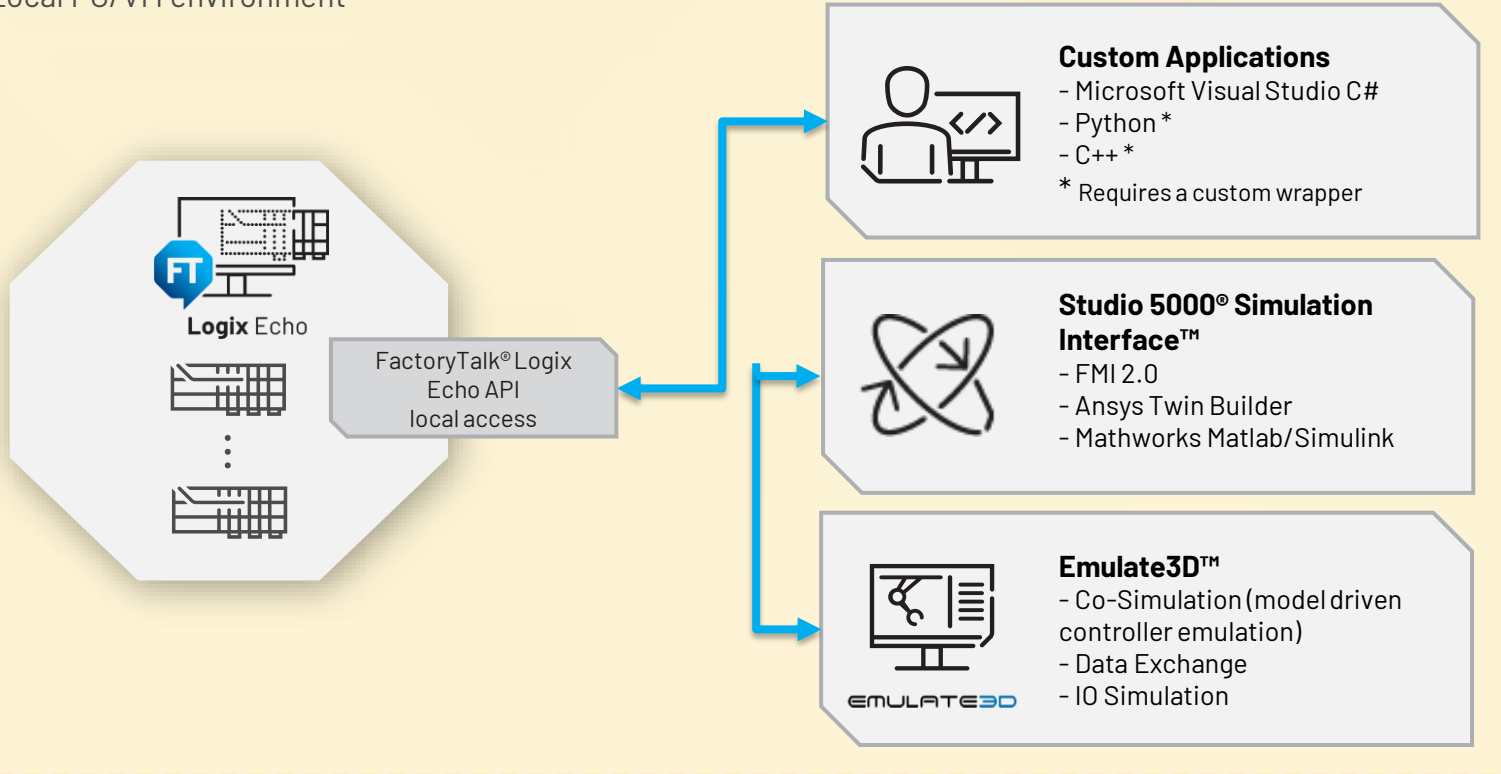
- Detailed explanations of all API functions and their uses with **sample code**
- **NuGet package**, includes **.NET Standard 2.0** assemblies, which allow access to API.



FactoryTalk® Logix Echo API

Connectivity scenarios

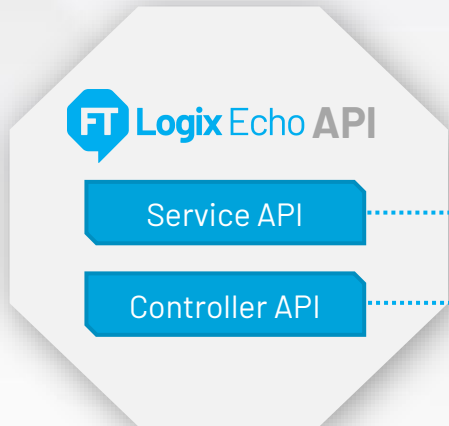
Local PC/VM environment



The FactoryTalk® Logix Echo API is always part of the product – it does not require additional license

FactoryTalk® Logix Echo API

API architecture and functions



- Controller/Chassis instance CRUD (Create, Read, Update, Delete, Configure)
- Controller download
- Controller mode change (RUN/REMOTE/PROG), On/Off
- Read/Write tags
- Operation mode change (**Free Running/Co-Simulation**)
- Controller execution request
- Time sync
- Continuous task fidelity adjustment

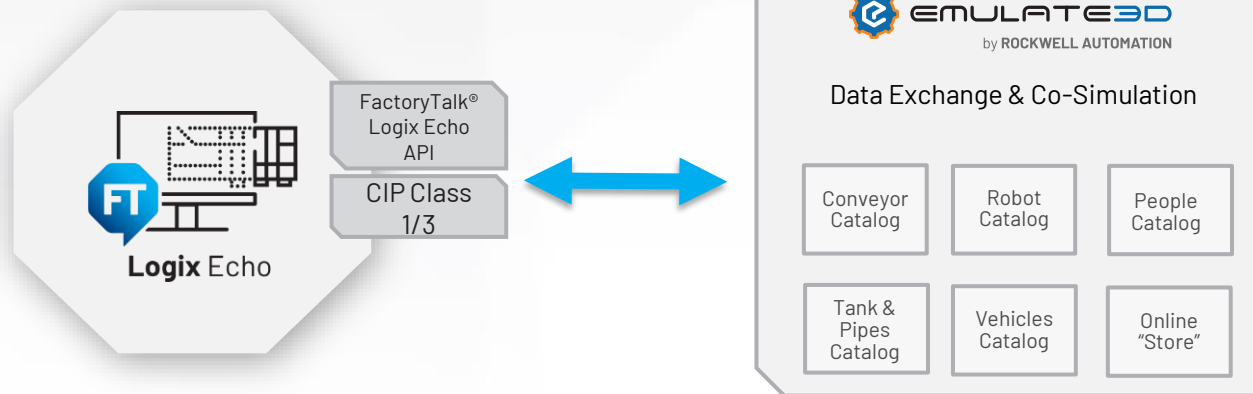
```
...se to create the controller
...lient.ListFirmwarePackages()).Fi
...
used, there is the option to add a pa
...
are available in the chassis taking into ac
...chassisOne = await serviceClient.ListAvailableS
...tInChassisOne = availableSlotsInChassisOne.Fir
...
e object with the desired data
...llerCreation = new ControllerUpdate
...
Guid = firmwareGuid,
...oller",
...A controller.",
...hassisOne.ChassisGuid,
...ilableSlotInChassisOne,
...Data = new IP4ConfigurationData
...
PAddress.Parse("127.0.0.1"),
PAddress.Parse("255.255.255.0")
...
... = KeySwitchPosition.Remote,
...
...false,
...rs\\Username\\projects\\project.ACD",
...
...e update object
...lient.CreateController(updateF
```

FactoryTalk® Logix Echo API

Functional Mockup Interface for Co-Simulation

Integration using Co-Simulation and Data Exchange API

- Enables E3D model and controller model to be synchronized
- Supports time-scaling (Change between Free-running mode and Co-Simulation mode)
- Modifying Continuous Task Fidelity (skip task scans)



FactoryTalk® Logix Echo API

High-Speed Data Exchange and Co-Simulation Interface for Integration with OTS

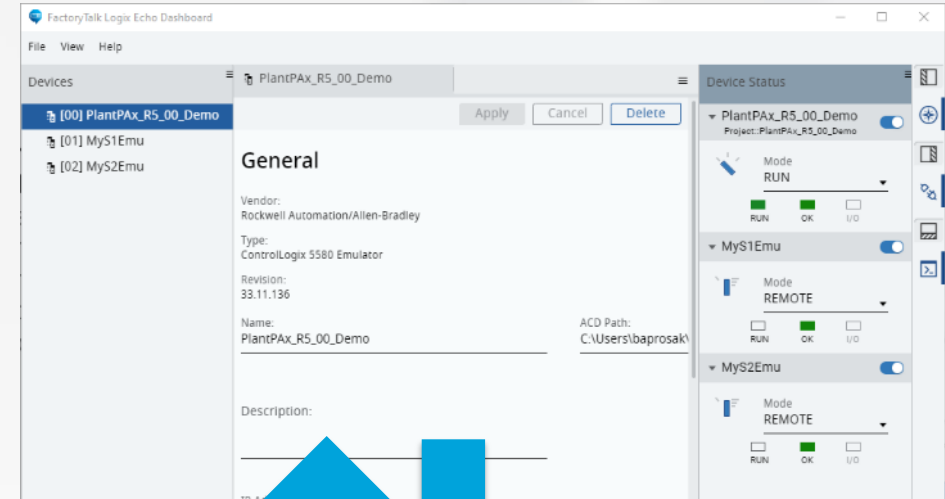
Overview

- Use your own or third-party party simulation tools to interact with emulated controllers to create and simulate the plant responses

Benefits

- Provides dynamic, real-time responses like the actual plant
- Train operators in specific scenarios in a safe, fully functioning virtual system using the actual displays from operations
- Develop and test new control strategies or plant optimizations in a lab environment

**Emulated
controllers**



**Operator
Training
Simulator**

