ARINC instruments

Ai429 ARINC 429 Bus Manager

Ai429 Product Line Introduction

May 2021

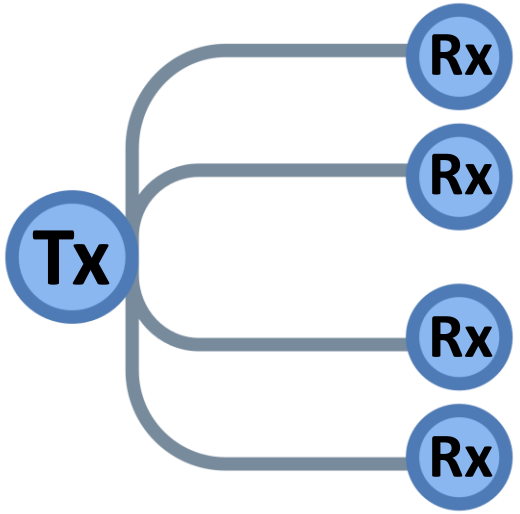
Who we are

- **Arinc Instruments (Ai) is a company dedicated to providing the best possible cross-platform COTS products and services in the aerospace industry.**

- **We provide a full line of ARINC 429 interface for a broad range of computer platforms to our innovative real-time Ethernet connectivity, various accessories, free application software and open-source API library.**

Introduction to ARINC 429 bus

- **The ARINC 429 is a data transfer standard for aircraft avionics – a Digital Information Transmission System (DITS).**
- **Most aircraft avionics simply send information that is required by *many* other avionic devices – such as a GPS receiver and various other sensors.**
- **It is a one-way broadcast communication bus - *there is never a need to talk back.***



What we offer

- ✓ Our products collect real-world data for aerospace, defense, energy, industrial and test industries allowing end-customers to build smart and reliable systems.

- ✓ Our deep line of avionic interfaces, test platforms, tools and software support the development of modern cross-platforms systems.

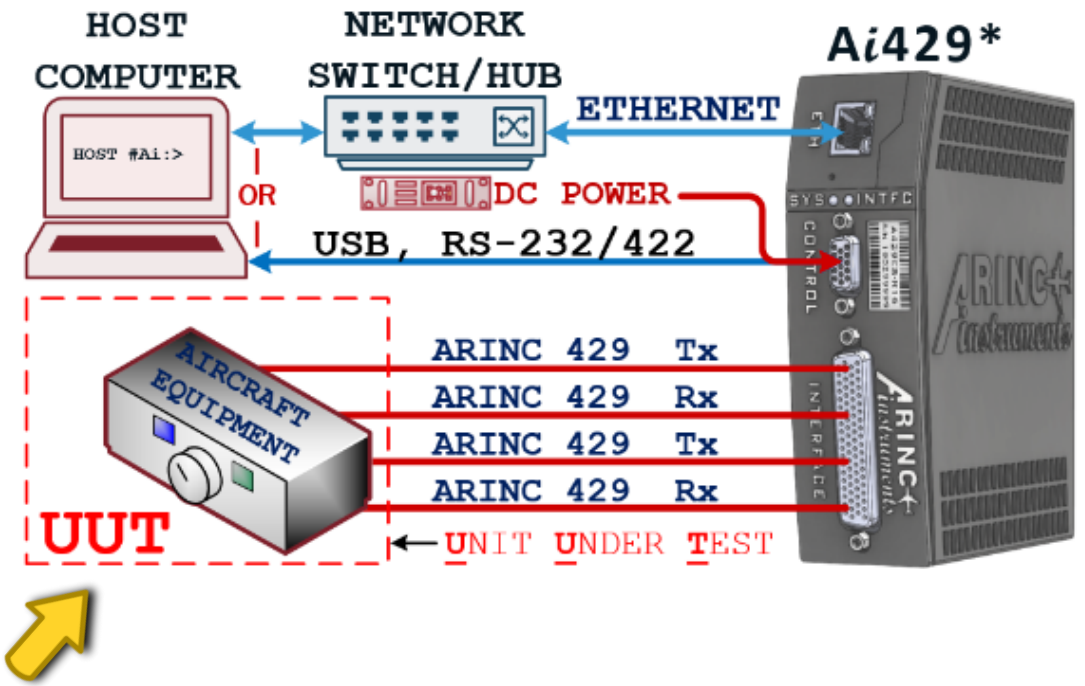
What we offer (cont.)

- Our free software and programming libraries provide a full suite of advanced features for use in any application requiring real-time data acquisition and analysis.

- Our cables, adapters and accessory kits ease installation from the I/O connector to the general connectors, providing access to all available I/Os.

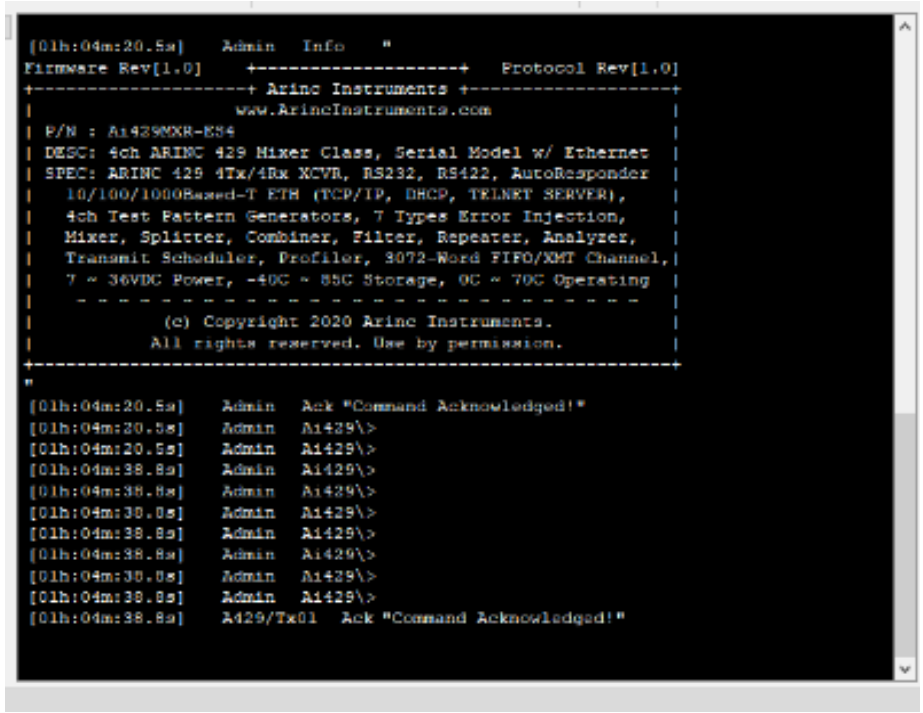
Product: Ai429 – Universal ARINC 429 Bus Manager

- The Ai429 is a standalone universal cross-platform ARINC 429 bus manager.
- It allows any host computer to interface with multiple 429 busses.
- The host connects to the Ai429 which connects to the avionics' 429 busses.



Ai429 – Command Line Interface

- The Ai429 communicates to any host computer without the need for special software application or drivers.
- The Ai429 communicates with any scripting language.
- The Ai429 also has an internal command line interface (CLI) that works with all terminal programs – such as PuTTy, TeraTerm, DOS command prompt, etc…



Not offered by competitors.

Only available from Arinc Instruments.

Ai429 – Choosing the Right Product

- There are **three factors** required when choosing an **Ai429** product:
  - **Function/Class**, **Model** and **Channel** count.

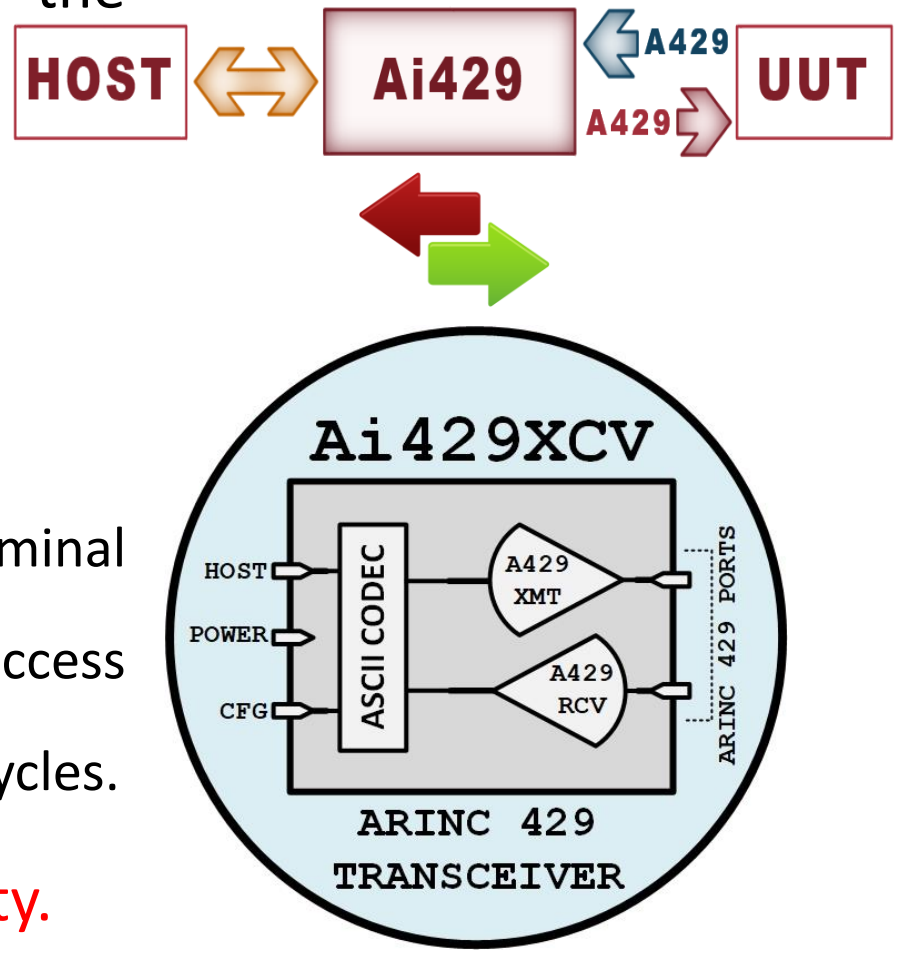
- What the product's does is its **function** (or class) and there are three:
  - **Transceiver**, **Tester** and **Mixer**.

- The product comes in two different models:
  - **Serial** model for a RS-232/422 and **USB** model for a USB-to-UART.

- The product's **channel count** is the number of available ARINC 429 channels:
  - **4, 8, 12 & 16** denoting (Tx & Rx) channel pairs.

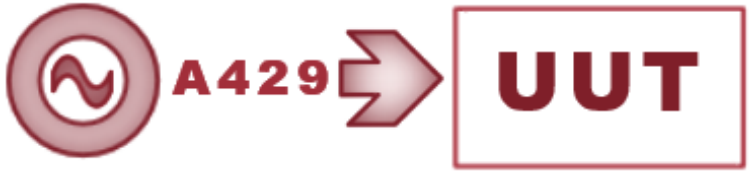
Ai429XCV – ARINC 429 Bus Transceiver

- The **Transceiver** product class (**Ai429XCV**) allows the host/user to:
  - *Transmits to multiple Arinc 429 buses.*
  - *Receives from multiple Arinc 429 buses.*
  - *Monitors & filters multiple Arinc 429 buses*.
  - Performs bus load analysis & reports to host computer.
  - Autoresponds to user programmed trigger data.
  - Converts received data to human readable stream.
  - Communicates with any/all scripting languages.
  - Internal Command Line Interface (CLI) mode for any terminal application.
  - Restrict host to prevent inadvertent internal resource access during runtime.
  - Retains user/host configuration to persist through power cycles.

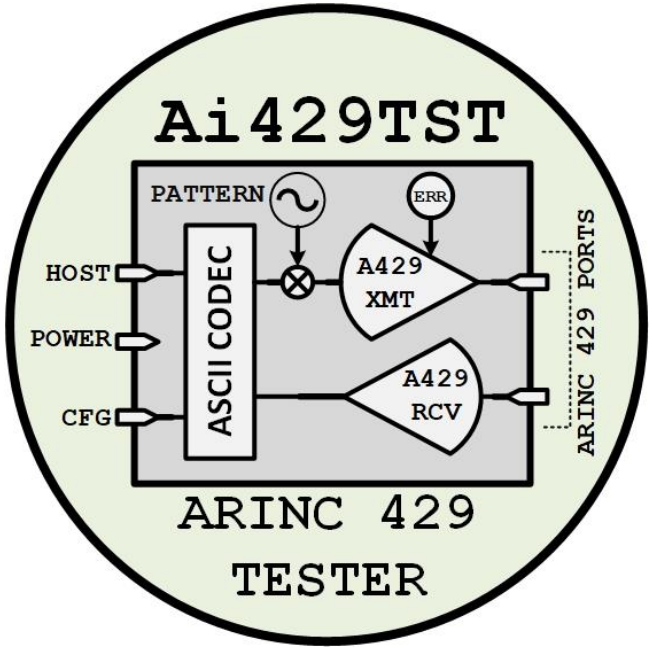


Competitor products only offer transceiver functionality.

Ai429TST – Universal ARINC 429 Bus Tester



- The **Tester** product class (**Ai429TST**) provides:
  - All the features of the (Ai429XCV) **Transceiver** products.
  - *Autogenerates test data patterns for development & regression testing.*
  - *Injects up to seven types of desired errors for testing, development & debugging*.

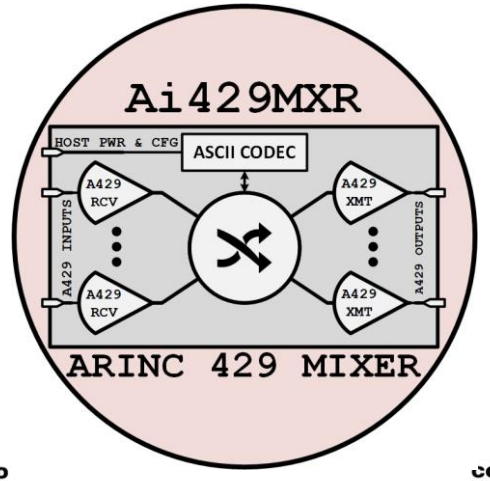


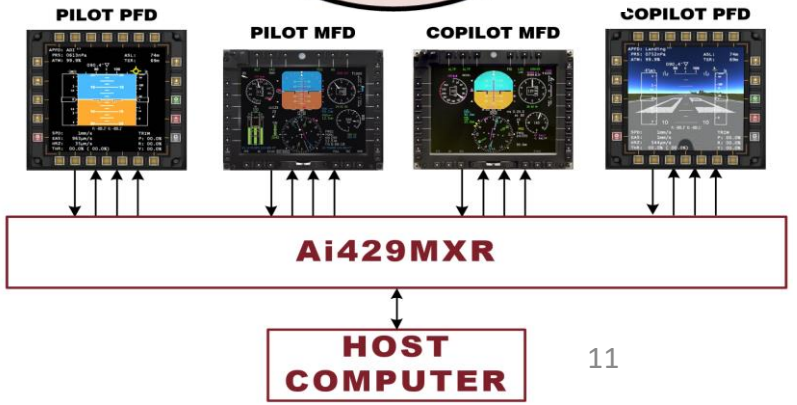
Competitor products only offer transceiver functionality.

This function is only available from Arinc Instruments.

Ai429MXR – Universal ARINC 429 Bus Mixer/Router

- The **Mixer** product class (Ai429MXR) provides:
  - All the features of the **Transceiver** product class.
  - All the features of the **Tester** product class.
  - *Can selectively connect multiple 429 buses.*
  - *Can create virtual 429 connections between devices.*
  - *Routes/switches/splits/merges/filters/repeats all ARINC 429 data buses just like a standard managed Ethernet switch.*
  - *Can operate as standalone – no host computer.*





Competitor products only offer transceiver functionality.

This function is only available from Arinc Instruments.

Ai429 – Universal ARINC 429 Bus Manager Models

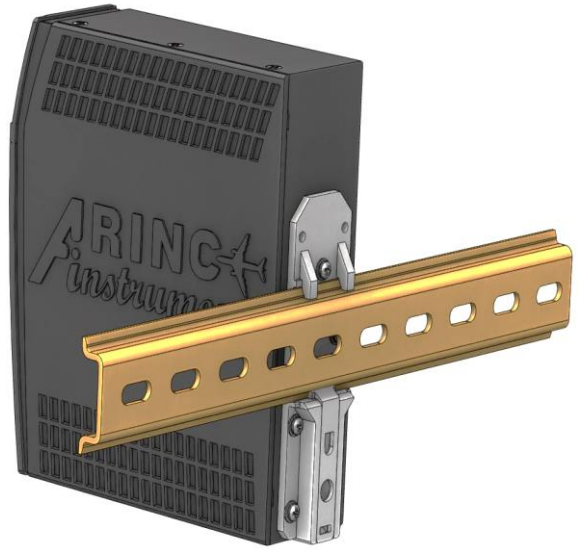
- The Ai429 comes in two basic **models**: **Serial** & **USB**.
- Both models offer a 1G Ethernet as *primary* host computer connection.
- The **USB** models offer a USB (as USB to UART) as *secondary* connection.
- The **Serial** models offer a RS-232 / RS-422 as *secondary* connection.
- The *primary* host connection is for speed – aggressive real-time testing.
- The *secondary* host connection is for convenience – development lab.

SERIAL MODEL

USB MODEL

Ai429 – Mechanical Mounting Options

- The Ai429 has numerous mechanical mounting options:
  - DIN rail mounting using rear adapter.
  - Desktop mounting using peel and stick rubber feet.
  - Standard 19” 1U shelf mounting.
  - Panel mounting via bottom four 6-32 threaded screw holes.



Ai429 Functional Summary

FUNCTIONS	Ai429XCV Transceiver	Ai429TST Tester	Ai429MXR Mixer
▪ Connects to any host computer ▪ Optionally time stamps all received data ▪ Decodes received data into various numerical bases (hex, dec…) ▪ Filters received data based on port, label & SDI ▪ Provides restricted Security Access Level for host connection ▪ Stores user configuration into internal nonvolatile memory ▪ Loads user configuration from internal nonvolatile memory ▪ Platform & terminal independent command line interface ▪ Free GUI application ▪ Free open source application development API C library ▪	✓	✓	✓
▪ Allows the connected host computer to transmit, receive and diagnose multiple ARINC 429 buses ▪ Filters only the desired received words ▪	✓	✓	✓
▪ Provides ARINC 429 testing functionalities ▪ Can generate and transmit test patterns and inject up to seven different types of errors on command ▪	✗	✓	✓
▪ Mixes, remixes, repeats, routes, filters, merges & splits ARINC 429 buses like a managed Ethernet switch ▪ Capable of networking multiple ARINC devices/buses ▪ Can create virtual 429 connection between devices ▪ Can inject data into active ARINC 429 DataStream in real-time ▪ Can transmit user defined data pattern in indefinite loop ▪	✗	✗	✓

Ai429 – Bus Manager Part Number Matrix

Ai429 Part Numbering Format

Ai429MXR-EU16

- Arinc Instruments = **Ai**
- ARINC 429 = **429**
- Transceiver Class = **XVR**
  Tester Class = **TST**
  Mixer Class = **MXR**

Number of ARINC 429 channels

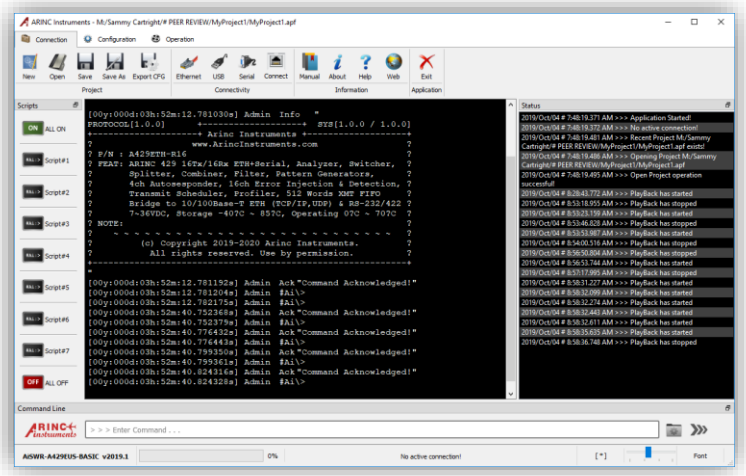
- **04** = 4 transmits & 4 Receives
- **08** = 8 transmits & 8 Receives
- **12** = 12 transmits & 12 Receives
- **16** = 16 transmits & 16 Receives

- **EU** = Ethernet & USB Model
- **ES** = Ethernet & Serial Model

All products can be upgraded to a higher tier.

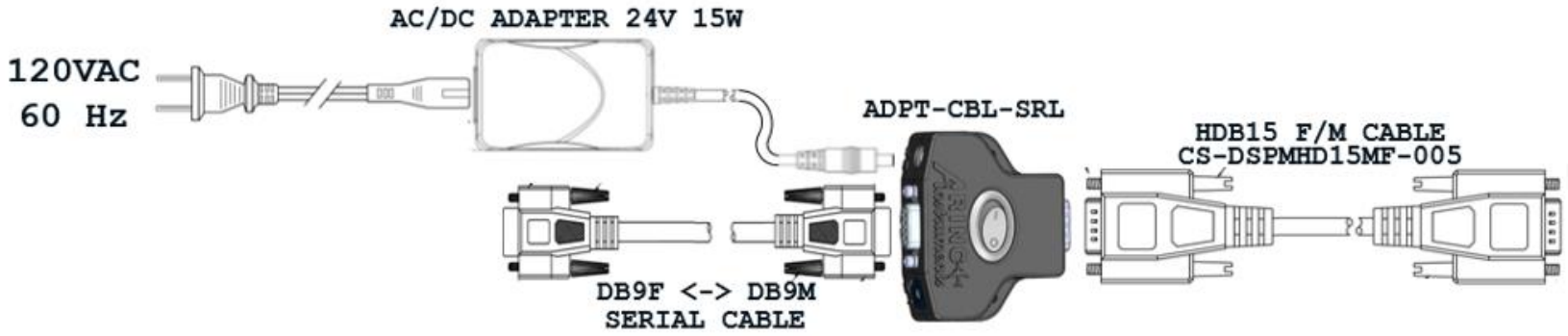
Please contact an Arinc Instruments' Sales Rep or Distributor for information.

Accessories:



- Our free software and programming libraries provide a full suite of advanced features for use in any application requiring real-time data acquisition and analysis.

- Our cables, adapters and accessory kits ease installation.
  - Instead of building a cable from scratch, we provide a cable adapter box. It allows the user to buy cheap COTS cables to the desired length, while the adapter interconnects the necessary signals.

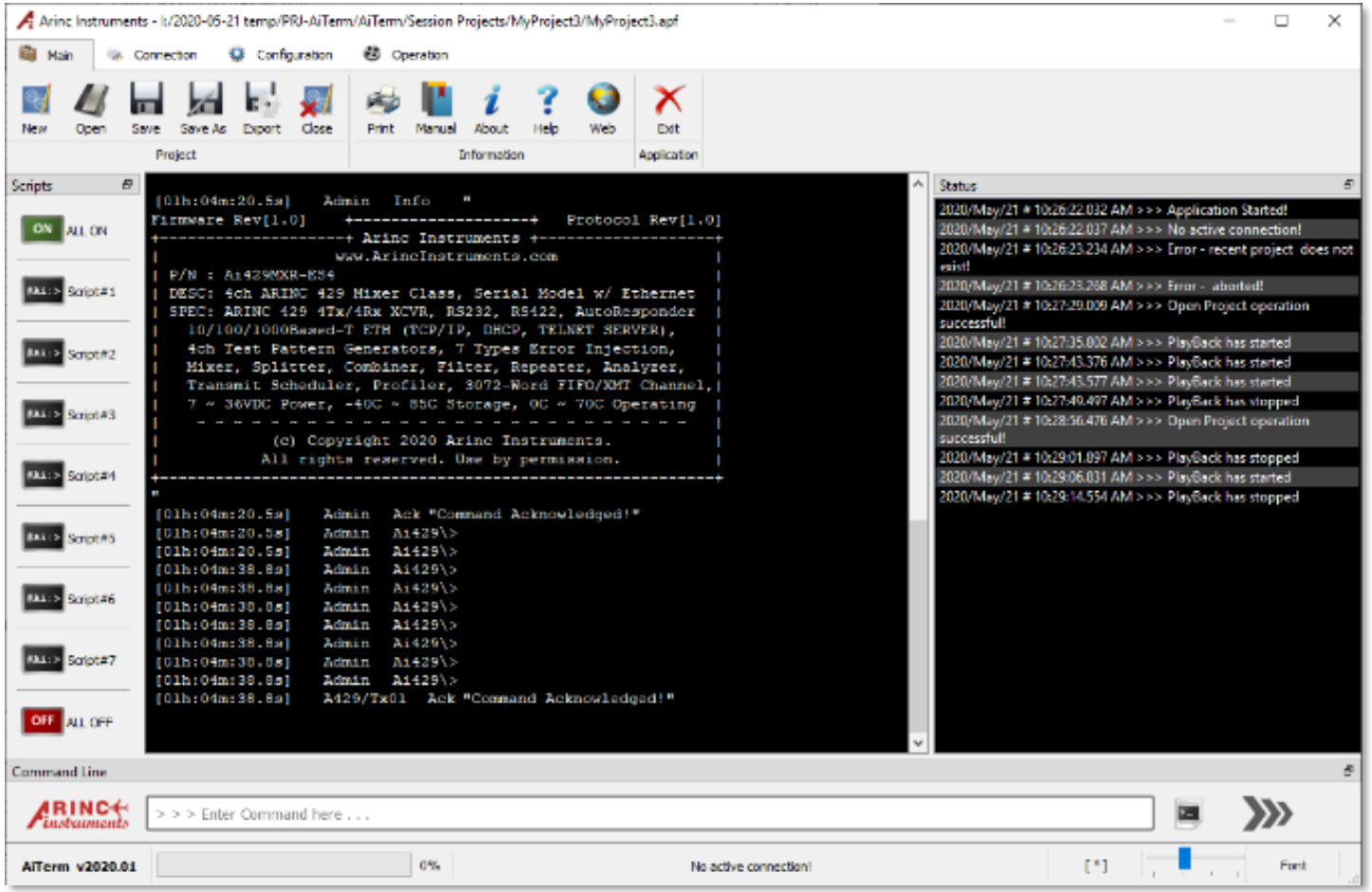


AiTerm – The FREE Arinc Instruments Application

- Arinc Instruments provides a ***free*** cross-platform GUI application (**AiTerm**) for a user-friendly point and click device configuration and usage.

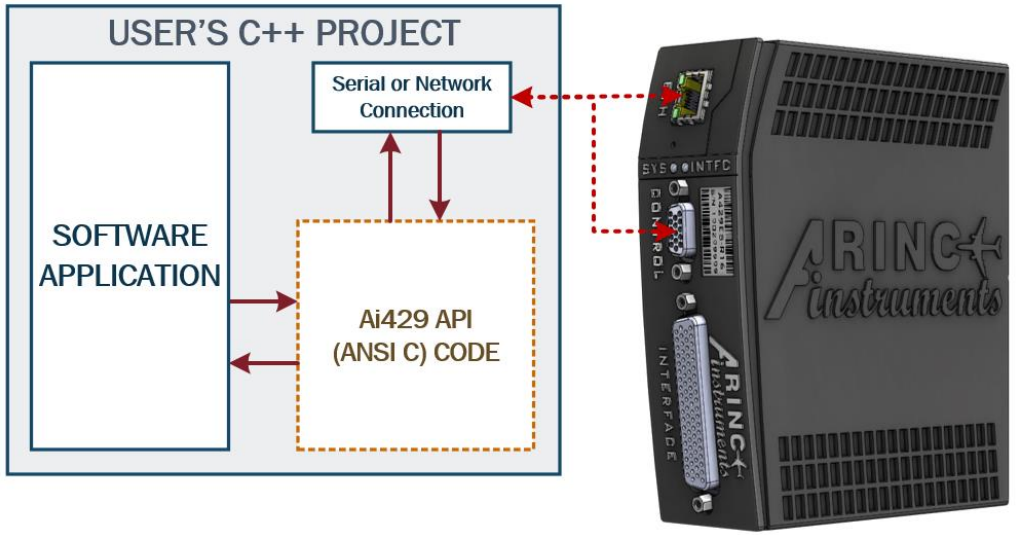
Competitors charge for their application software.

Our application is FREE!!!



Ai429API – FREE Open-Source Ai429 API Library

- The Ai429 comes with a FREE open-source cross-platform API library – in ANSI C.
- It is thread safe and platform independent.
- A sample Qt project is provided as a working example.
- A sample Visual Studio project will soon follow.



Some competitors charge for their API library.

Our API library is FREE and open-source!!!

Typical applications

- Aircraft System Simulation (SIM)
- Automated Test System (ATS)
- Ground Support Equipment (GSE)
- Validation & Verification (V&V)
- Regression Testing (RT)
- Extended Stress Testing (ESS)
- System Diagnostic
- Software Development
- Flight Line Diagnostic
- Portable Tester
- New Product Development (R&D)
- Upgrade existing test system

Typical applications (cont.)

Aircraft System Simulation (SIM)

- Can be used to communicate to avionic system to simulate aircraft environment.

Automated Test System (ATS)

- Can be used in automated test controlled by script/software.

Ground Support Equipment (GSE)

- Can be used in GSE setup or lab environment for system diagnostics.

Validation & Verification (V&V)

- Can be used for system validation and verification using the various fault injection and data test pattern generation features.

Extended Stress Testing (ESS)

- Can be used foe extended stress testing by using the auto test pattern generation to test a unit under test for extended period of time.

Typical applications (cont.)

System Diagnostic

- Can be used to diagnosed a system by monitoring multiple buses and observing the timing relationships between the messages and well and the flow of data.

Software Development

- Can generate data to or from software system.

Portable Tester

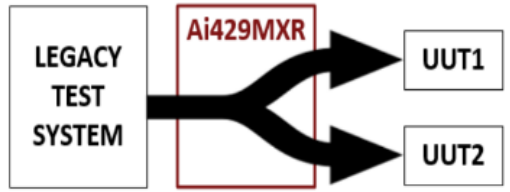
- Can be used in portable tester setup (1 lb)

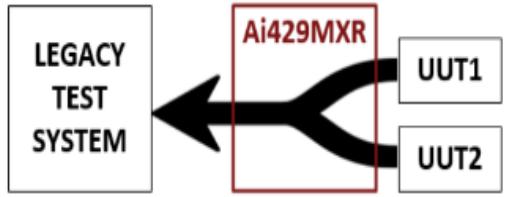
New Product Development (R&D)

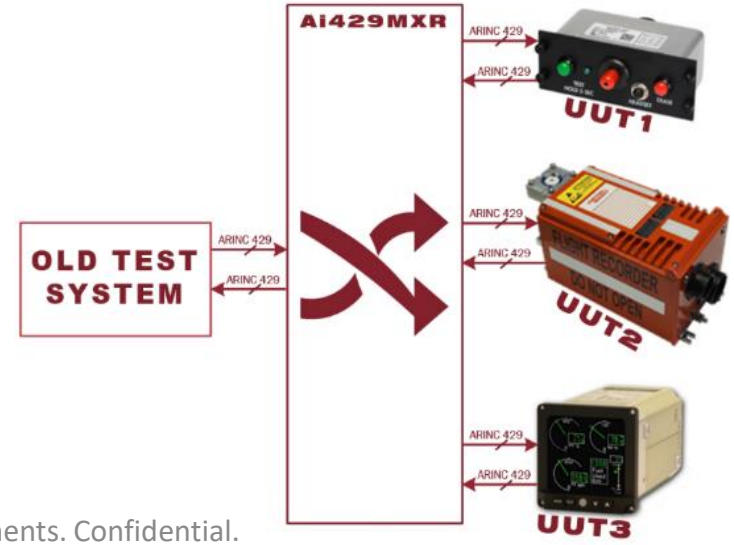
- Can generate very timing accurate test data patterns to help new product development.
- Can read multiple data buses from multiple devices.

Typical applications (cont.)

- Upgrade Existing Test System
  - Can increase the number of outputs in existing test system by splitting data buses.
  - Can increase the number of inputs in existing test system by merging data buses.







Typical applications (cont.)

Virtually Connect Multiple Avionic Devices

- *Can selectively connect multiple 429 buses.*
- *Can create virtual 429 connections between devices.*
- *Routes/switches/splits/merges/filters/repeats all ARINC 429 data buses just like a standard managed Ethernet switch.*
- *Can operate as standalone – no host computer.*