Plug-in ICOM card
Agenda

- Products with different interface
- Isolated and Surge Protection
- Hands-on for Installation & Simple test – ICOM
- Hands-on to Connect ADAM-4000 by RS-485 wiring directly
Products with different interface
The Evolution of Serial Communication

- **ISA**
  - Low cost
  - Compatibility
  - Widely used
  - Low speed (64M bps)
  - Jumper & DIP switches
  - Obsolete

- **PC/104**
  - High speed (up to 8G bps)
  - PnP
  - Dominant board-level bus
  - Incompatible with older systems
  - More expensive than ISA

- **Universal Low Profile PCI**
  - Support 3.3V and 5V signaling
  - Greater flexibility

- **PC/104+**
  - Designed for industrial use
  - Hot swapping / PnP
  - Low speed than PCI (1G bps)
  - Need adapter for PC use
  - Incompatible with older systems

- **Compact PCI**
  - Low cost
  - Compatibility
  - Widely used
  - Low speed (64M bps)
  - Designed for industrial use
  - Hot swapping / PnP
  - Low speed than PCI (1G bps)
  - Incompatible with older systems

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Open eAutomation, Boundless Integration
ISA (Industry Standard Architecture) Bus

- Defined by IBM and it is also called AT Bus
- Easy to design
- Transmission data rate: $8.33 \times 2 = 16.66 \text{ MHz}$—low speed
- PnP not supported
- Only 16 bit support
- Configured by hardware
- Because the performance and transfer quality are worse than PCI bus, it is replaced by PCI, AGP, and USB interface gradually.
ISA Series Card Example: PCL-746+

4-port RS-232/RS-422/RS-485 Interface Card

Main Features
• Four independent RS-232/422/485 serial ports
• Speeds up to 115.2 kbps
• Interrupts (jumper selectable): 3, 4, 5, 6, 7, 9, 10, 11, 12 or 15
• Onboard interrupt status register for greater throughput
• Automatic data flow control in RS-485 mode
• RS-422 or RS-485 modes jumper selectable
• Space reserved for optional surge protection on all port lines (in RS-422/485 modes)
• Space reserved for termination resistors
• Compatible with ARCNET® 4-port cards supporting SCO UNIX/XENIX
• Supports Windows® 98/2000/XP, Linux®
• Powerful and easy-to-use utility (ICOM Tools)
PCI Bus

- 32-bit standard bus width with a maximum transfer rate of 133 Mbytes/s
- Expansion to 64 bits with a maximum transfer rate of 266 Mbytes/s
- Supporting of 5V and 3.3V power suppliers—Universal Bus
- Operating frequencies from 0MHz to a maximum of 33 MHz
- Multiplexing of address and data bus reducing the number of pins
- Configuration through software and registers
- 32- and 64-bit cards can be installed in 64 and 32-bit slots
Universal Low Profile PCI (I)

- What is *Universal* PCI?
  - Support universal architecture that can source power signaling at either 3.3 volts or 5 volts.

**Benefit:** You can plug Universal PCI card into ANY PCI slot.
Universal Low Profile PCI (II)

- What is *Low Profile* PCI?
  - New PCI card standard for space-constrained system designs
  - Same electrical, protocols, signals and S/W drivers as PCI v2.2 cards

- The physical dimension
  - MD1: shortest length of the card, 119.91 mm x 64.41 mm (4.721”)

Benefit: The size is smaller, and that gives you flexible utilization
Benefits of PCI Bus

- Multiple bus masters on the same bus
- Auto-configuring
- IRQ sharing
- High bus bandwidth
- Support multiple function cards
PCI Series Card Example: PCI-1625U

8-port Intelligent RS-232 Universal PCI Communication Card

Main Features
- RISC processor (TMS320)
- 1MB SRAM
- PCI specification 2.2 compliant
- Speed up to 921.6 kbps
- 8-port RS-232
- I/O address automatically assigned by PCI
- Plug & Play
- OS supported: Windows 2000/XP
- Powerful and easy to utility (ICOM tools)
- Link with OPT8FP peripherals up to 1200m (4000ft) from controller (RS-422)
- Universal PCI (supports 3.3 V or 5 V PCI bus signal)
CompactPCI Interface

- Defined by PICMG
- It is electrically a superset of desktop PCI with a different physical form factor. CompactPCI utilizes the Eurocard form factor popularised by the VME bus.
- Defined for both **3U** (100mm by 160 mm) and **6U** (160mm by 233.35 mm) card sizes,
- 32 bit—133MB/s, 64 bit—256MB/s
- Could support up to **256** PCI bus
- Excellent shock and vibration characteristics
- User I/O connections on front or rear of module
- Staged power pins for Hot Swap capability
MIC Series Card Example: MIC-3620

8-port RS-232 Communication Card

Main Features
- PCI Specification 2.1 compliant
- Speeds up to 921.6 kbps
- 16C954 UARTs with 128-byte standard
- 8-port RS-232
- Standard Industrial CompactPCI® 3U Board size
- I/O address automatically assigned by PCI Plug & Play
- OS support: Windows® 98/NT/2000/XP
- Interrupt status register for increased performance
- Optional surge protection
- Space reserved for termination resistors
USB Interface

- **USB (Universal Serial Bus)**
  - Most common computer port today
  - Connect up to 127 peripherals (with hub)
  - Plug & Play

- **USB 1.1 (Since 1996)**
  - 12 Mbps for high speed devices
  - 1.5 Mbps for those need much less bandwidth

- **USB 2.0 (Since 2002)**
  - 480 Mbps data transfer rate => 40 times faster
Isolated and Surge Protection
Protection

- **Isolation**
  - Separate of circuit can prevent the abnormal signal from influencing the whole system.
  - For continuous high voltage protection

- **EFT Surge Protection**
  - Protect the parts which are connecting with the input signal. And we need it in case the input signal is with an electrical spike which will damage the receiver.
  - For sudden high voltage protection

- **ESD (Electrostatic Discharge) Protection**
  - Prevent the electrostatic from damage the circuit.
  - Ex: Plug or unplug the cable.
Strength: Isolation & Surge Protection

- Isolation: 3000 V$_{DC}$
- Surge Protection: 3000 V$_{DC}$

ADAM-4000 (Remote I/O)

RS-422/485 Serial Network

Ethernet

ADAM-5000/485 (Remote I/O)

Open eAutomation, Boundless Integration
Isolated Protection
Surge Protection
Hands-on for Installation & Simple test – ICOM
How to Install ICOM Cards?

- For ISA interface (PCL and PCM series)
  1. Check the resource on PC (I/O Address)
How to Install ICOM Cards?

- For ISA interface (PCL and PCM series)
  Check the resource on PC (IRQ)
PCL 746+ Hardware

[Image of a motherboard with labels for Base Address, Port Mode, IRQ, and Vector address and IRQ mode]

Open eAutomation, Boundless Integration
PCL-746+ Hardware Setting

- I/O Address—Set address to transfer data
- Enhanced Mode—Share IRQ mode
- Standard Mode—Independent IRQ
- Vector Address—Set address to share IRQ
- IRQ—Interrupt Request
- Mode Setting—RS-232, RS-422/485 mode
- Transfer Speed—1X, 8X
How to Set Address (Hex)—Ex. 1

User Defined

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Always Zero

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Note: ON = 0, OFF = 1

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How to Set Address (Hex)—Ex. 2

ON

OFF

Binary

Always Zero

Note: ON: 0  OFF: 1

Open eAutomation, Boundless Integration
Practice—Set Address to 3E8H

Always Zero

ON

OFF

Binary

ON

OFF

Note: ON: 0 OFF: 1
On-Line Training: How to install ISA bus ICOM card under Windows system
How to Install ICOM Cards?

- For Plug & Play Interface (PCI, PC/104+, and USB Series)
- Plug the cards in PC
  - for PnP cards, H/W will be installed after PC boots or re-scan of device in Windows device manager
PCI-1612U Hardware

- Port Mode
- Flow Control setting
- Setting Guide

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How to Know What Mode COM Port Is?

In the image, the Device Manager window is opened, showing the ports and devices. The focus is on the Advantech PCI Serial Port (COM10) properties. The settings tab is highlighted, showing the default communications parameters. The COM 10 setting is indicated, along with options for data bits, parity, stop bits, and flow control. The text overlay suggests that the user can see the COM 10 setting in the software interface.
ICOM Examine Tool

- ICOM Configuration Tool: Easy to Use
  - Port configuration.
    - You can configure the Baud rate, data bits, parity, stop bits, and flow control mode according to your need.
  - Loading test.
    - Verify the performance of serial communication.
  - Loopback test.
    - Active loopback test.
    - Passive loopback test.
  - History message log.

- Complete Driver Support
  (9X/NT/2K/XP; Linux)
ICOM Terminal Tool

- Hyperterminal-Like Tool
Hands-on to Connect ADAM-4000 by RS-485 wiring directly
How to connect ADAM-4000 Series Modules by RS-485 wiring directly
Hands on Practice

- Use ICOM Tool and Hyper-Terminal to test PCL-746+ and PCM-3614
  - Familiar with test utility
  - Learn how to set the I/O address, Vector Address, and IRQ
- Use ICOM Tool, Hyper-Terminal, and ADAM4000-5000 Utility to test PCI-1612CU
  - Know the operation when transfer data by serial port
  - Learn how to change transfer modes by hardware setting
Conclusion

- Know the basic knowledge of RS-232, RS-422/485
- RS-485 is the most popular protocol for Automation application
- Know the function of Isolation, Surge and ESD Protection
- Know the differences of bus interface
- Learn trouble-shooting in hands on practice
Thanks~~~