Networks Are For Sharing...

Hardware

Data Files

Software Applications

Standards and Protocols

Every sharing process from carpools to drive-thru bank lines has its own rules...

Standards are how things should be; they set the minimum performance level.

Protocol are sets of rules and agreements on how elements interact.

Communication Standards

- **RS-232C - Uses voltage amplifier circuit for serial communication, uses three wire configuration (send, receive, ground reference), limited to 50 feet, uses 25 pin or 9 pin D shaped connection, optional handshaking signals for communication controls can be used, uses -3 to-15 = “0” and +3 to +15 = “1” referenced to ground**

- **0 and 20 MA - Current loop convention which was established for Teletype machines. Has higher signal noise immunity then RS-232C, longer transmission cable lengths, does not have well defined control signals for control of complex devices.**

- **RS-422 - Another voltage amplifier circuit for serial communication, uses non referenced 0 to 5 volts with polarity switching to represent “0” or “1” bits**

Use of Personal Computers

- **The user can perform the following functions:**
  - **access the system**
  - **backup and restore each analyzers program**
  - **store analyzers results**
  - **create historical trends**
  - **monitor the overall system**
  - **perform “off-line” data analysis**

Gas Chromatograph Network Configurations

- **Reduce analyzer I/Q quantity and complexity**
- **Simplify analyzer maintenance and control**
- **Allow sophisticated data archiving and retrieval**

Typical Analyzer Network

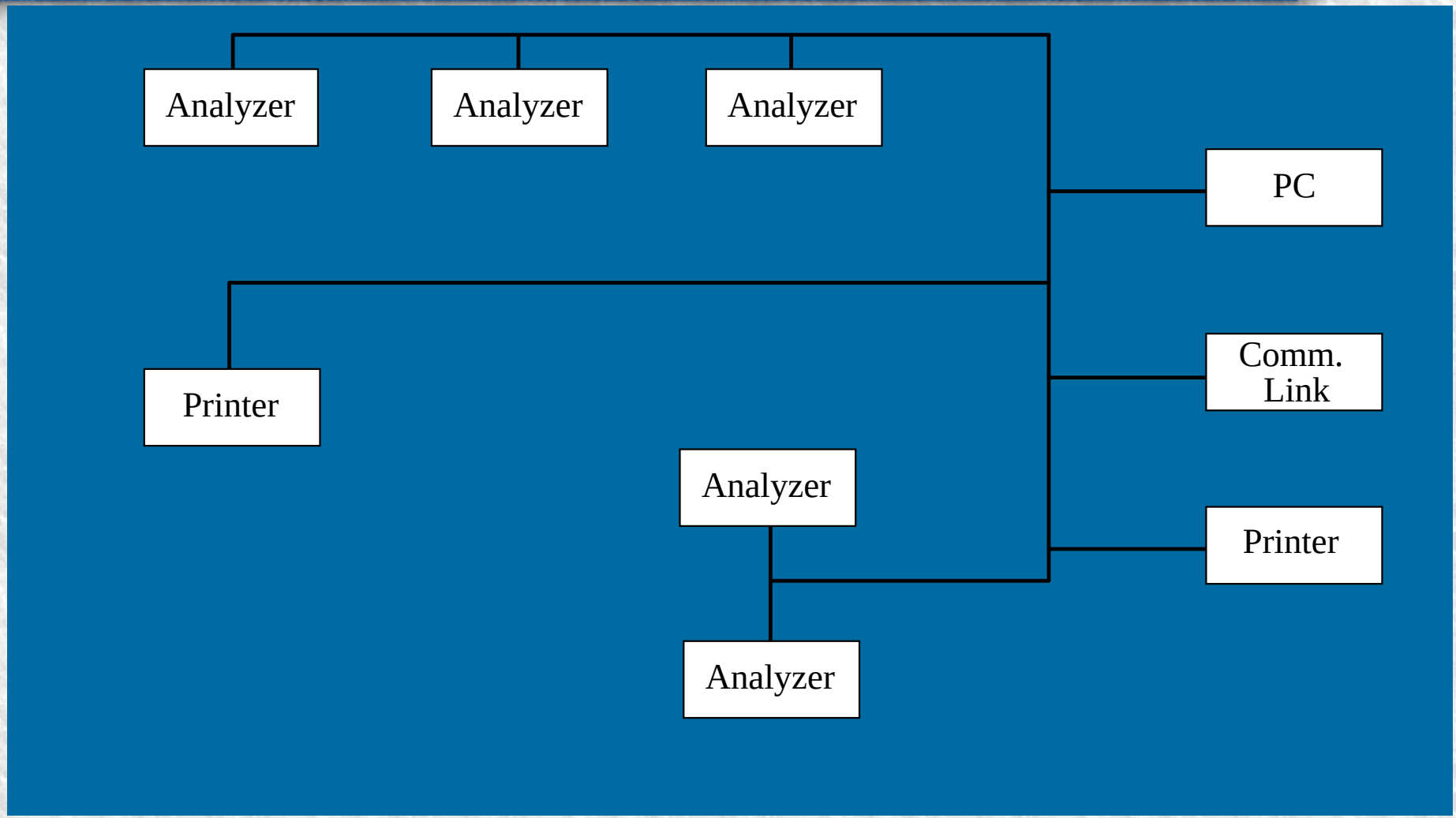

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Figure 72

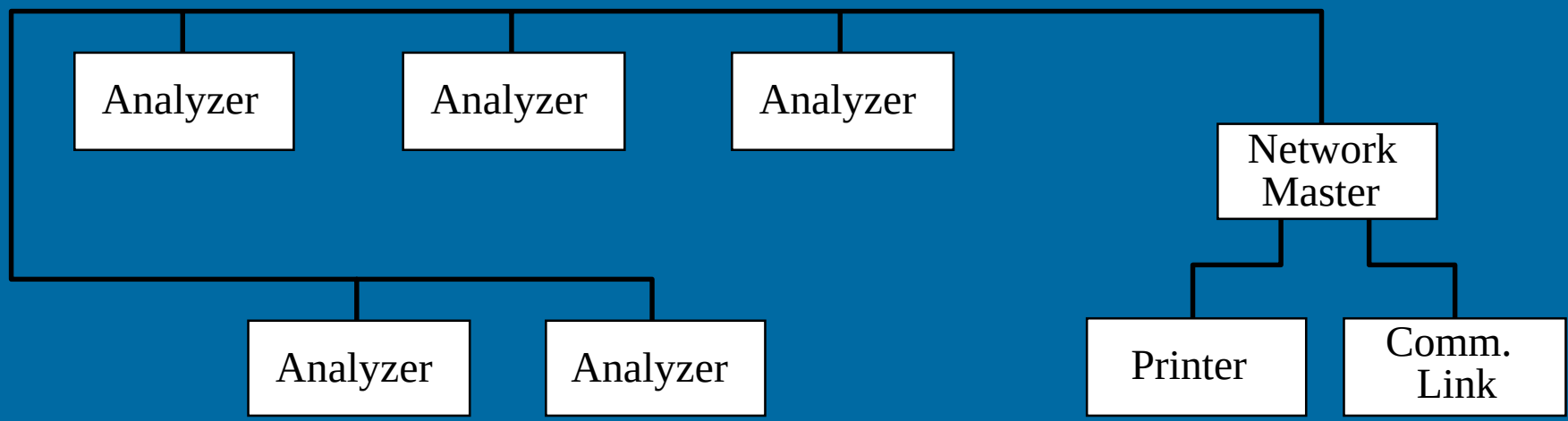
Analyzer Networks

- **ALLOWS PLANT PROCESS DATA TO BE COLLECTED FROM ALL ANALYZERS CONNECTED TO THE NETWORK VIA COMMON HARDWARE AND CABLES**

- **THIS DATA CAN BE SENT TO OPERATIONS, MAINTENANCE, AND ENGINEERING PERSONEL BY WAY OF DCS, PRINTER, TREND RECORDER, AND ALARM PANEL**

- **THIS DATA IS USED TO CONTROL AND OPTIMIZE PLANT PROCESSES AND TO SCHEDULE EFFICIENT MAINTENANCE PLANNING OF PROCESS CONTROL EQUIPMENT INCLUDING THE ONLINE ANALYZERS**

Typical Master/Slave Network



Master / Slave Networks

- **CENTRALIZED COMMUNICATIONS CONTROLLER REGULATES DATA FLOW, AND ACCESS TO THE NETWORK**

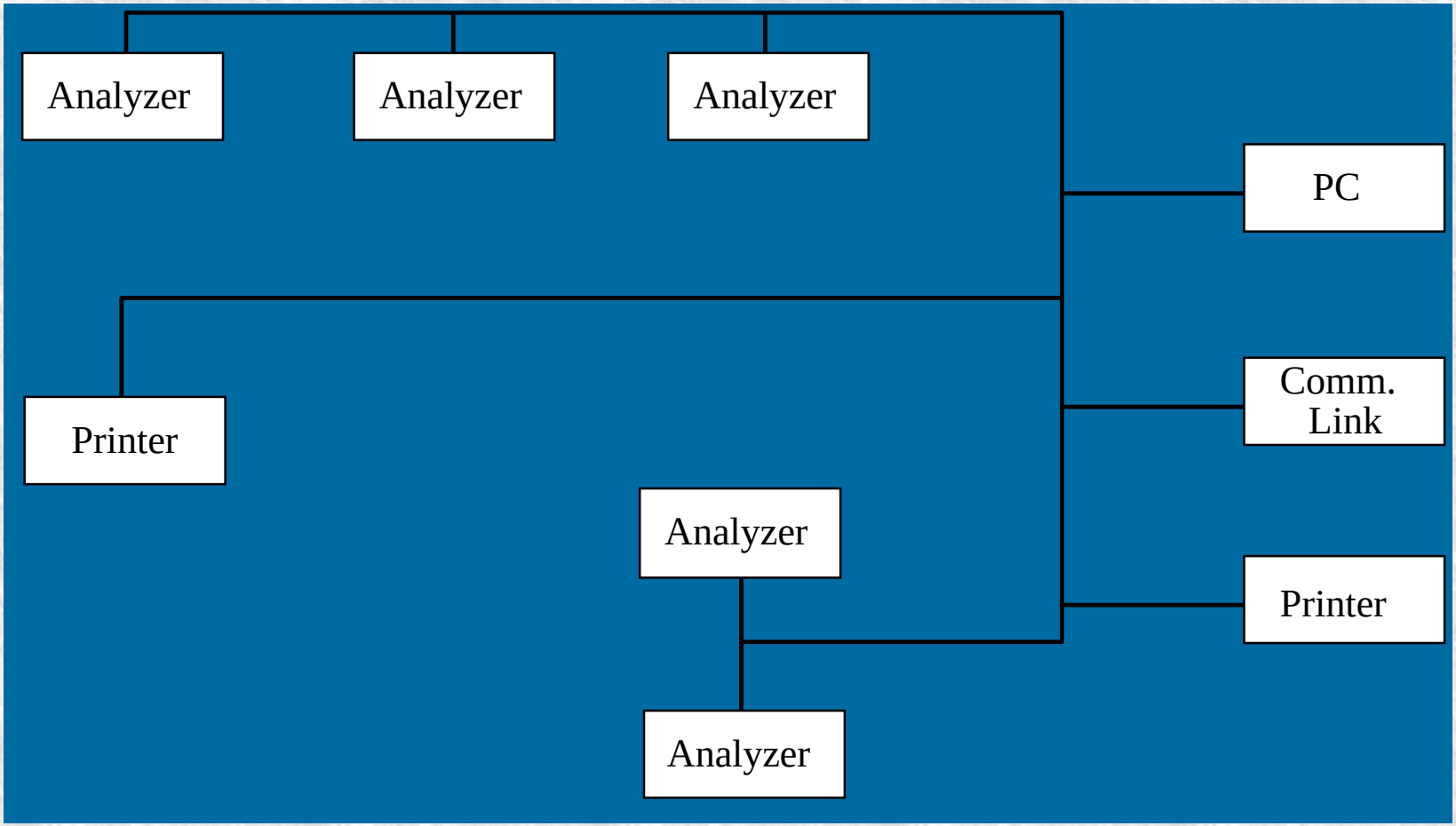
- **ALL OTHER DEVICES ARE SLAVED TO THE MASTER CONTROLLER AND COMMUNICATE THROUGH IT**

- **MASTER CONTROLLER ACTS AS CENTRAL I/O DEVICE BETWEEN ANALYZER NETWORK AND DCS SYSTEM, PRINTER AND OTHER PERSONAL COMPUTERS**

- **LOW COST COMMUNICATIONS HARDWARE AND CONFIGURATION IS TYPICALLY EASIER TO TROUBLESHOOT**

- **LACK OF SYSTEM REDUNDANCY, CONFIGURATION FLEXIBILITY OF OTHER SYSTEM DEVICES SUCH AS PERSONAL COMPUTERS, PRINTERS IS LIMITED**

Typical Masterless Network



Masterless Networks

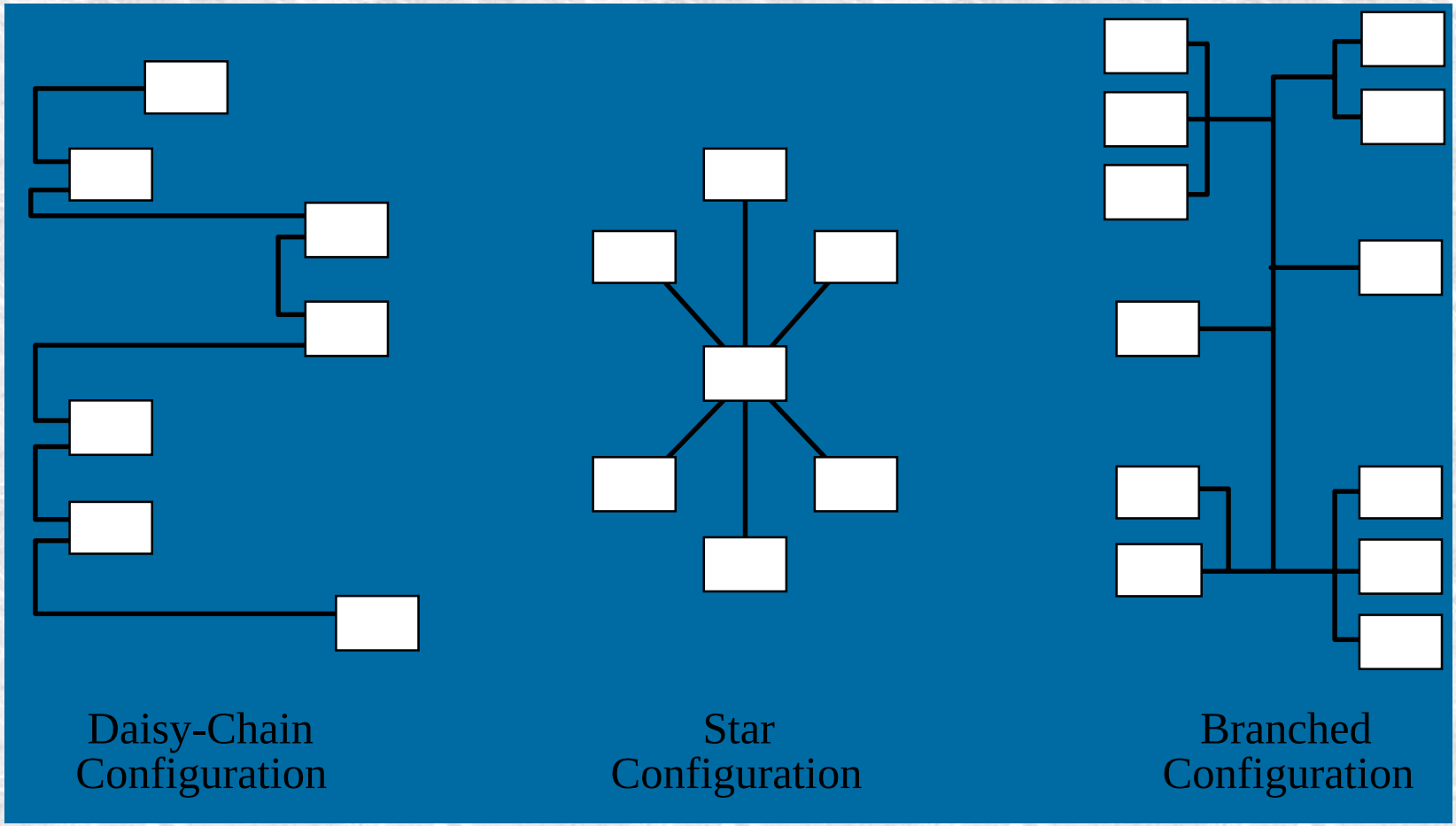
- **ANALYZERS, PRINTERS, WORKSTATIONS, PROTOCOL COMMUNICATION BOARDS, ETC. EACH ARE "SMART" AND HAVE THEIR OWN ONBOARD NETWORK COMMUNICATION CONTROLLER**

- **ANY DEVICE CAN BE THE MASTER (PEER TO PEER OR DISTRIBUTED CONTROL SYSTEM) BY WAY OF "ACCESS CONTENTION" PROCEDURE**

- **"ACCESS CONTENTION" ALLOWS ONLY ONE DEVICE TO TALK AT A TIME ON THE NETWORK "HIWAY"**

- **HIGHER COST COMMUNICATIONS HARDWARE AND CONFIGURATION IS TYPICALLY HARDER TO TROUBLESHOOT**
- **COMPLETE SYSTEM REDUNDANCY, CONFIGURATION FLEXIBILITY OF OTHER SYSTEM DEVICES SUCH AS PERSONAL COMPUTERS, PRINTERS IS VERY FLEXIBLE**

Network Topology



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