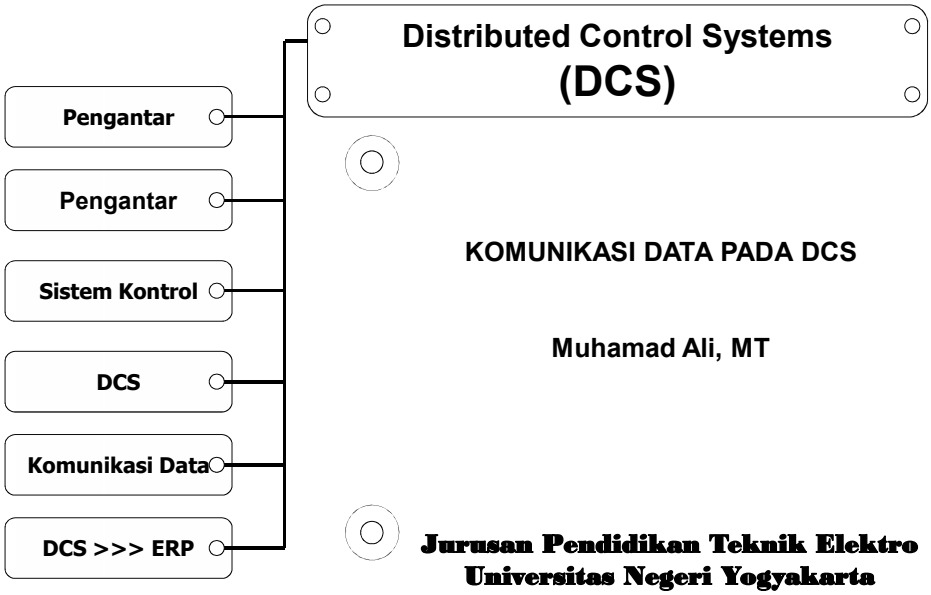


Komunikasi Data Pada DCS

- Integrasi pada DCS memerlukan mekanisme komunikasi antar sub sistem
- Komunikasi yang dibangun digunakan untuk komunikasi data antar sub sistem yang diintegrasikan
- Perlu media komunikasi yang sesuai
- Topologi jaringan yang dibentuk disesuaikan dengan kebutuhan

Komunikasi Data Pada DCS

Prev. Next Main

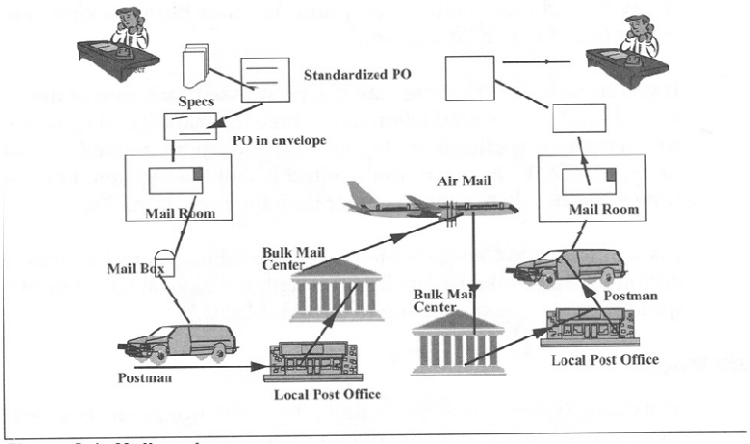
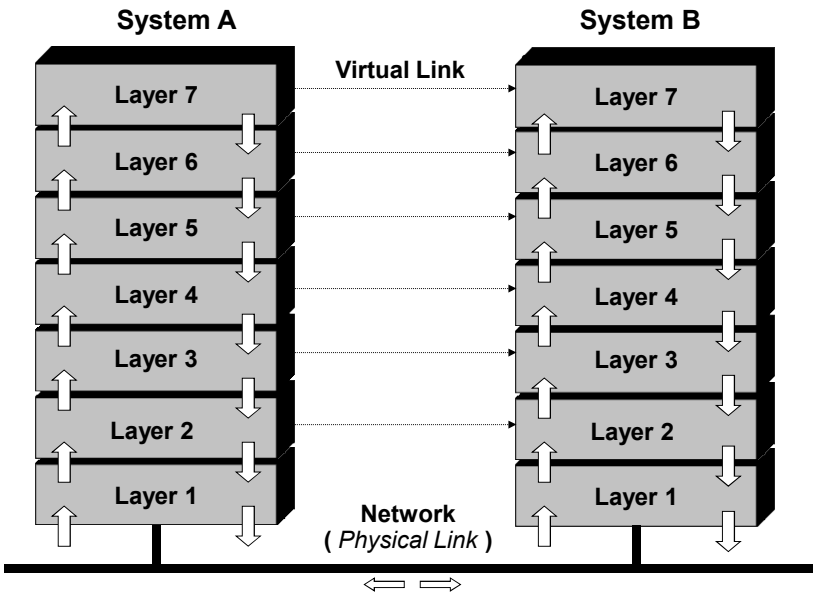


Figure 2-1. Mail analogy.

Hierarkhi Komunikasi Data



Komunikasi Data Pada DCS

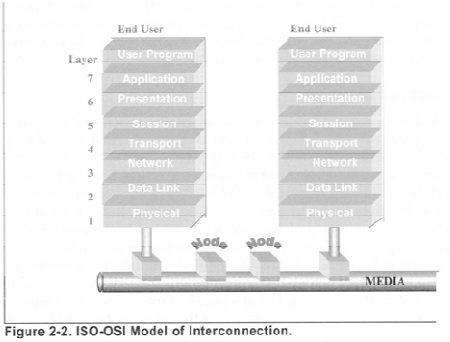


Figure 2-2. ISO-OSI Model of Interconnection.

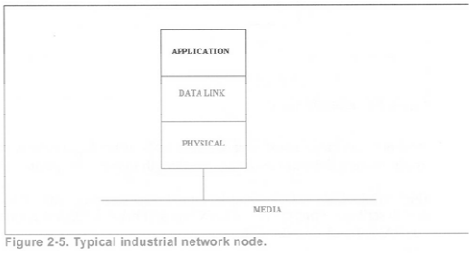
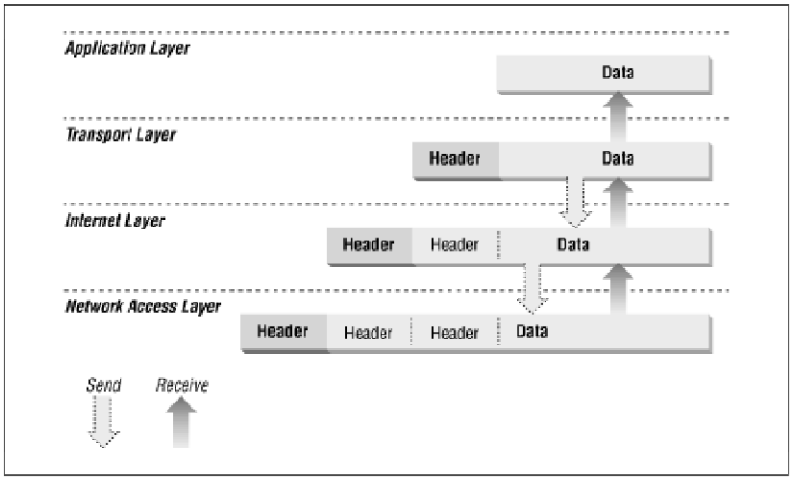


Figure 2-5. Typical industrial network node.

TCP/IP

- TCP:
  - Transport Control Protocol
  - Layer 4
- IP:
  - Internet Protocol
  - Layer 3
- Developed by the Defense Department (USA) in the 1970s
- Using TCP/IP, Messages can be
  - Segmented
  - Routed

TCP/IP - Augmentasi



TCP/IP – Kelebihan/Kekurangan

Kelebihan

- Open standard
- Free
- Language of the Internet
- Provides reliable data transmission and reception

Kekurangan

- Requires considerable overhead
- Has known security holes
- Not a real time system

Fieldbus

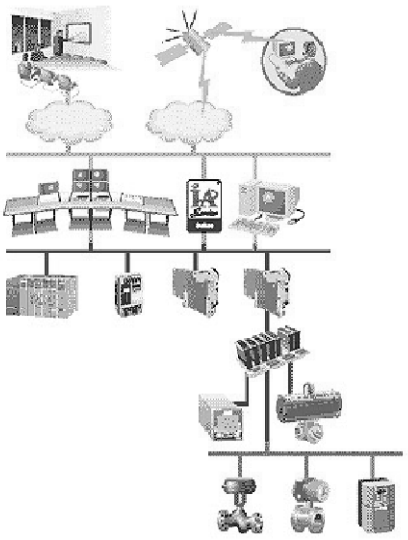
Prev. Next Main

- Dikembangkan Oleh Komite ISA SP50
- Fieldbus foundation provides
  - Specifications
  - Support
  - Hardware
  - Software

Fieldbus

Prev. Next Main

- low node costs
- Extremely reliable
- Simple to operate
- “real-time”



Profibus

PROFIBUS is the only field bus that can be used in equal measure in production automation and process automation and has since become a global market leader. Worldwide, over 20 million PROFIBUS devices are in use (as of 2007).

PROFIBUS (Process Field Bus) is a standard for field bus communication in automation technology and was first promoted (1989) by BMBF (German department of education and research). It should not be confused with the PROFINET standard for industrial Ethernet

Type of Network	Device Bus, Process Control
Physical Media	Twisted pair, fiber
Network Topology	Bus
Device Addressing	DIP Switch or hardware/software
Governing Body	PROFIBUS&PROFINET International (PI)
Website	www.profibus.com

Jenis Profibus

PROFIBUS DP (Decentralized Peripherals) is used to operate sensors and actuators via a centralized controller in production technology. The many standard diagnostic options, in particular, are focused on here. Other areas of use include the connection of "distributed intelligence", i.e. the networking of multiple controllers to one another (similar to PROFIBUS FMS). Data rates up to 12 Mbit/s on twisted pair cables and/or fiber optics are possible.

PROFIBUS PA (Process Automation) is used to monitor measuring equipment via a process control system in process engineering. This PROFIBUS variant is ideal for explosion-hazardous areas (Ex-zone 0 and 1). Here, a weak current flows through bus lines in an intrinsically safe circuit so that explosive sparks are not created, even if a malfunction occurs. The disadvantage of this variant is the slower data transmission rate of 31.25 kbit/s.

DeviceNet

DeviceNet is a communication protocol used in the automation industry to interconnect control devices for data exchange.

It uses Controller Area Network as the backbone technology and defines an application layer to cover a range of device profiles. Typical applications include information exchange, safety devices, and large I/O control networks.

DeviceNet was originally developed by American company Allen-Bradley (now owned by Rockwell Automation). It is layered on top of the CAN (Controller Area Network) protocol, developed by Bosch

DeviceNet

- Defines the Media, Physical, Data-Link, and Application layers of the ISO/OSI 7-layer model
- Incorporates trunkline topology with separate buses for signal and power (Typical configuration: two twisted pairs and a single shield)
- Baudrates defined: 125 kbit/s, 250 kbit/s, and 500 kbit/s
- Trunk length is inversely proportional to the speed, i.e. 500, 250 and 100 meters respectively
- A not-so new flat cable was added to the specification to allow the use of the quick-fix connector
- Up to 64 nodes on a single logical network. (Node addresses range from 0 - 63)
- Supports master/slave as well as peer-to-peer communication, although majority of the devices work in the master/slave configuration

DeviceNet

- Allows multiple masters on a single logical network
- Network cable can supply device power along same cable as communication cable (Generally smaller devices such as photo-eyes, limit switches, and proximity switches).
- Networked devices can be simultaneously controlled and configured
- Engineered to withstand noisy environments

Open Process Control (OPC)

- OPC (formerly: "OLE1 for Process Control", now: "Open Process Control") is an industry standard set up by the *OPC Foundation* specifying the software interface (objects, methods) to a server that collects data produced by field devices and programmable logic controllers

Komponen Utama

- OPC-DA (Data-access)
- OPC-AE (Alarm and Events)
- OPC-HAD (Historical Data Access)

Open Process Control (OPC)

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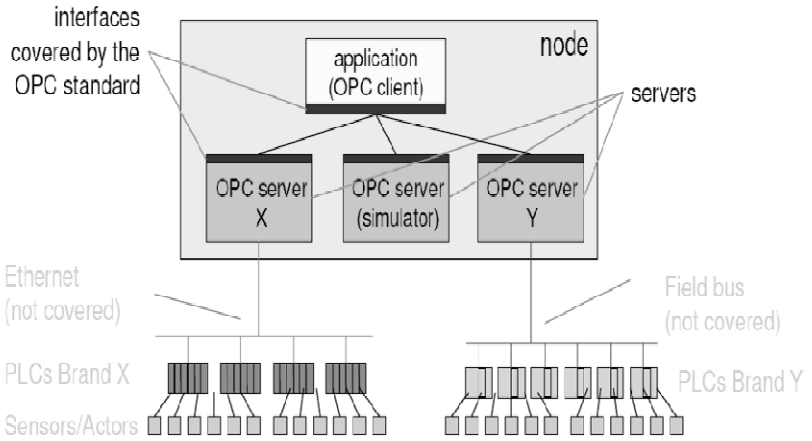
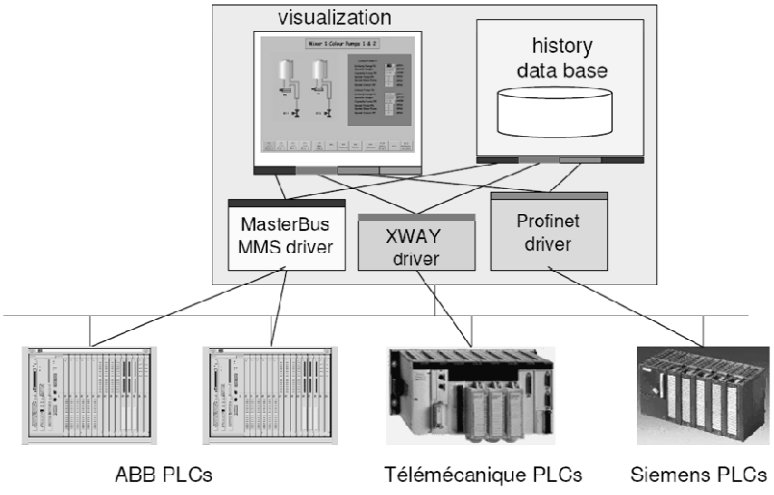
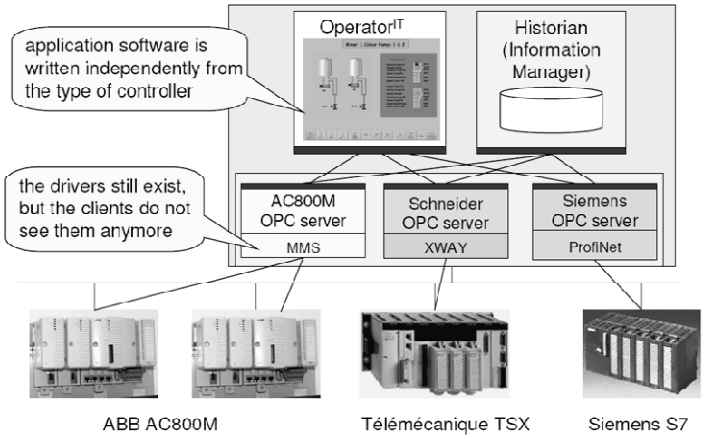


Sebelum OPC

Prev. Next Main



Setelah OPC



HART

- HART kependekan dari “Highway addressable remote transducer”
- Uses the same 4-20mA wiring
- Super imposes the digital signal on the top of the analog one

Keunggulan

35-40 data items Standard in every HART device
Device Status & Diagnostic Alerts
Process Variables & Units
Loop Current & % Range
Basic Configuration Parameters
Manufacturer & Device Tag

Standard commands provide easy access
DDL not necessary (or desirable) to get this data

Increases control system integrity
Get early warning of device problems
Use capability of multi-variable devices
Automatically track and detect changes (mismatch) in Range or Engineering Units
Validate PV and Loop Current values at control system against those from device

HART

Prev. Next Main

Keunggulan

HART is Safe, Secure, and Available
- Tested and Accepted global standard
- Supported by all major instrumentation manufacturers

Saves Time and Money
- Install and commission devices in fraction of the time
- Enhanced communications and diagnostics reduce maintenance & downtime
- Low or no additional cost by many suppliers

Improves Plant Operation and Product Quality
- Additional process variables and performance indicators
- Continuous device status for early detection of warnings and errors
- Digital capability ensures easy integration with plant networks

Protects Asset Investments
- Compatible with existing instrumentation systems, equipment and people
- Allows benefits to be achieved incrementally
- No need to replace entire system

Struktur HART

Prev. Next Main

	OSI Layer	Function	HART
7	Application	Provides the User with Network Capable Applications	Provides the User with Network Capable Applications
6	Presentation	Converts Application Data Between Network and Local Machine Formats	
5	Session	Connection Management Services for Applications	
4	Transport	Provides Network Independent, Transparent Message Transfer	
3	Network	End to End Routing of Packets. Resolving Network Addresses	
2	Data Link	Establishes Data Packet Structure, Framing, Error Detection, Bus Arbitration	A Binary, Byte Oriented, Token Passing, Master / Slave Protocol.
1	Physical	Mechanical / Electrical Connection. Transmits Raw Bit Stream	Simultaneous Analog & Digital Signaling. Normal 4-20mA Copper Wiring

Topologi Jaringan

Prev. Next Main

- Koneksi antar sistem berdasarkan tinjauan fisik dan mekanisme komunikasi dalam suatu sistem network (logic).
- Macamnya ada :

Star Toplogy

Bus Topology (Parallel Topology)

Ring Topology

Tree Topology

Mixed Topology

Topologi Jaringan

Prev. Next Main

- Koneksi antar sistem berdasarkan tinjauan fisik dan mekanisme komunikasi dalam suatu sistem network (logic).
- Macamnya ada :

Star Toplogy

Bus Topology (Parallel Topology)

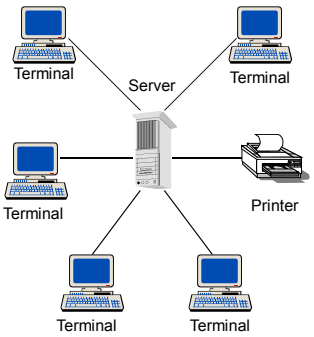
Ring Topology

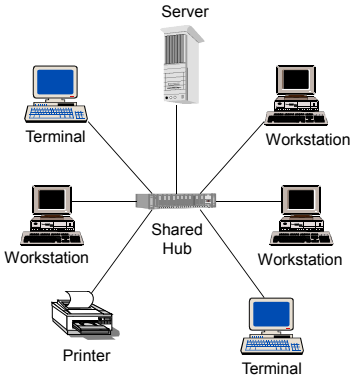
Tree Topology

Mixed Topology

Hubungan Star

Prev. **Next** **Main**





Kelebihan :

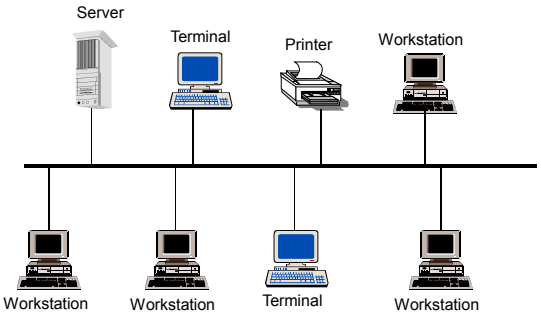
- Kemudahan transmisi
- Kemudahan dalam hal penanganan troubles
- Kemudahan pemasangan kabel

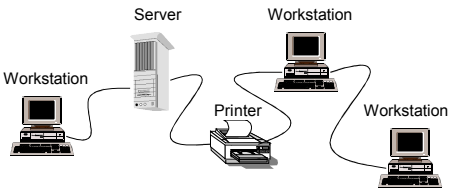
Kekurangan :

Mengalami kesulitan untuk pemasangan kabel dalam jumlah besar.

Hubungan Bus

Prev. **Next** **Main**





Kelebihan :

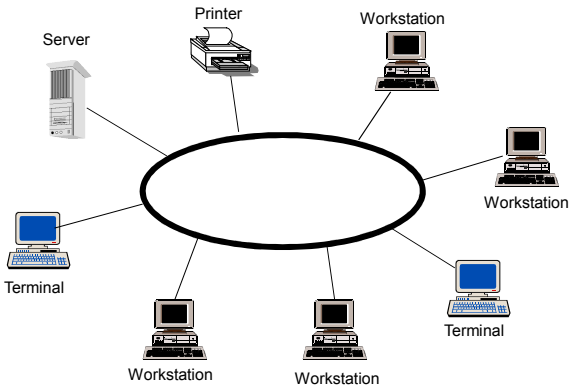
- Efisien kabel
- Biaya instalasi kabel rendah

Kekurangan :

- Sukar diimplementasi untuk susunan yang tidak teratur.
- Performance turun untuk banyak node
- Penanganan troubles rumit.

Hubungan Ring

Prev. **Next** **Main**



Kelebihan :

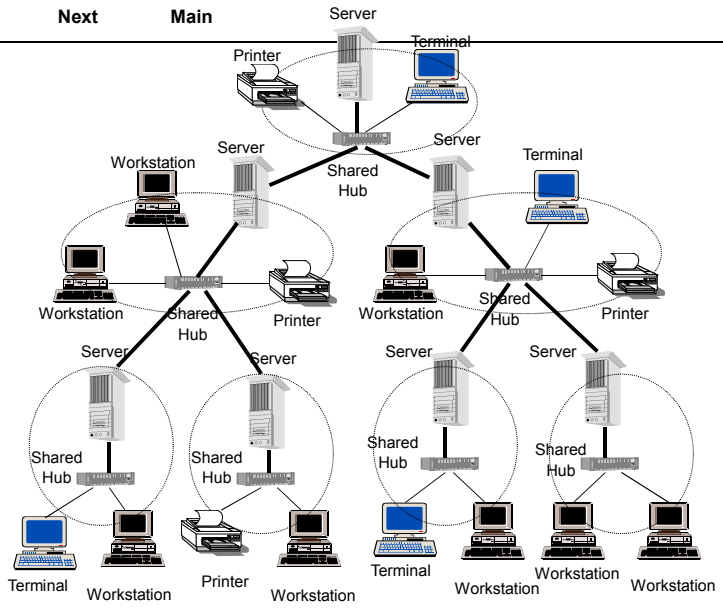
Dalam hal tertentu memiliki sistem fault-tolerence yang lebih baik.

Kekurangan :

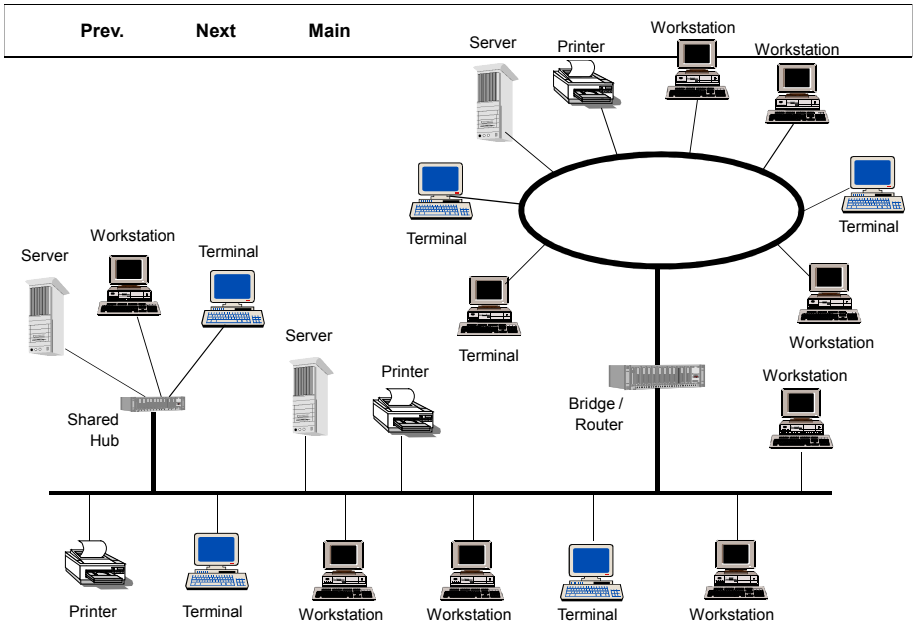
- Sistem pengkabelan rumit
- Biaya instalasi kabel tinggi
- Penanganan troubles rumit.

Hubungan Ring

Prev. **Next** **Main**



Hubungan Ring



Terima Kasih