

Jaringan Komputer

Struktur dan Arsitektur Jaringan Komputer

Dimodifikasi:

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Objectives

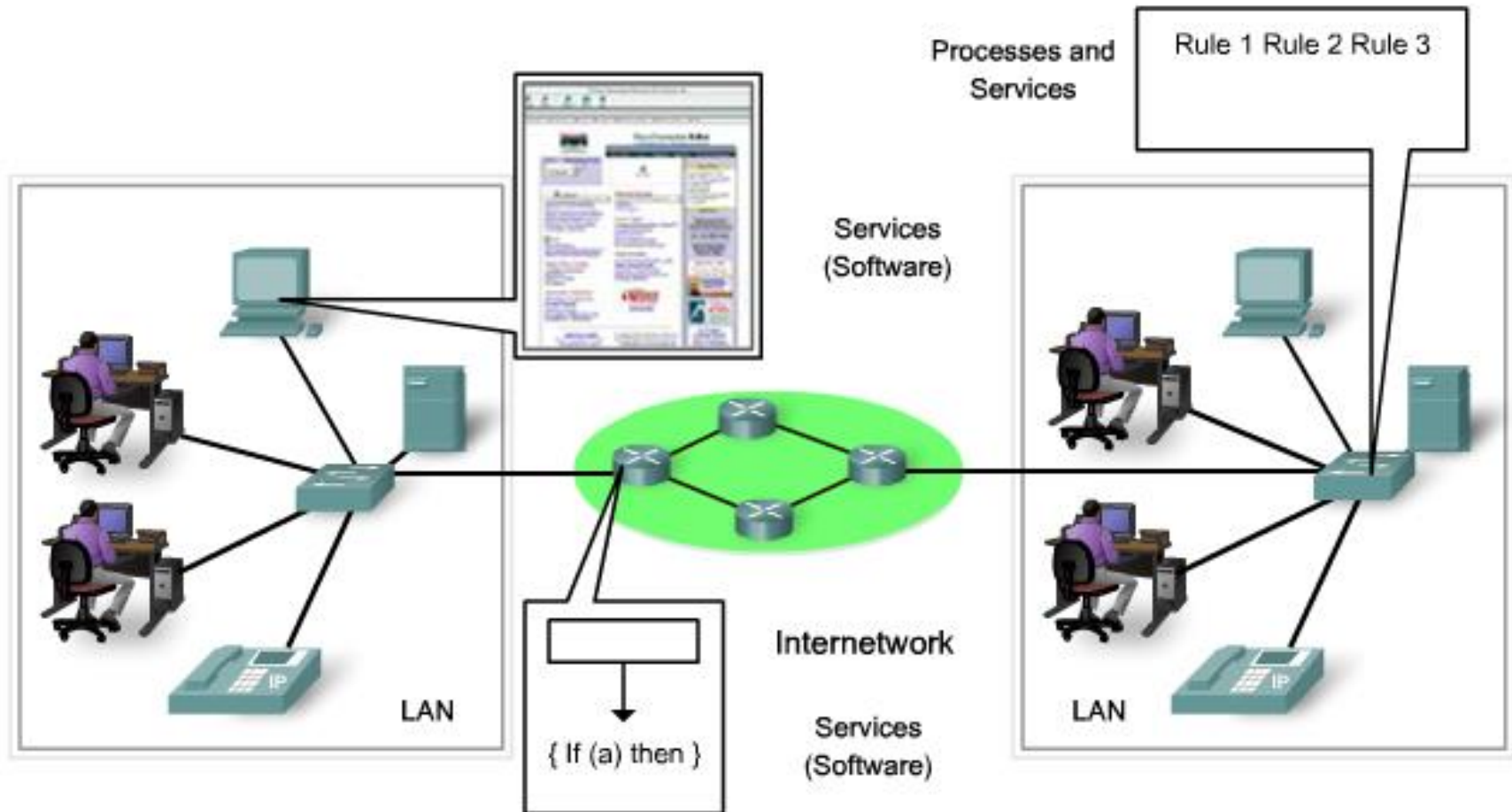


- Struktur Jaringan Komputer
- Klasifikasi jaringan komputer
- Topologi Jaringan
- Arsitektur jaringan
- Media Jaringan dan spesifikasinya
- Standarisasi IEEE

Struktur Jaringan Komputer



Networks use devices, media and services.

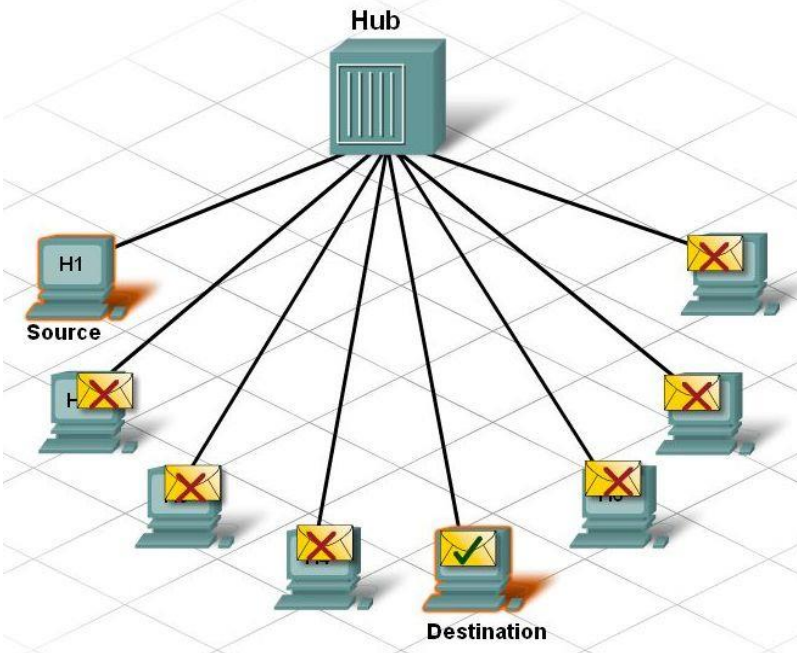


Struktur Jaringan Komputer

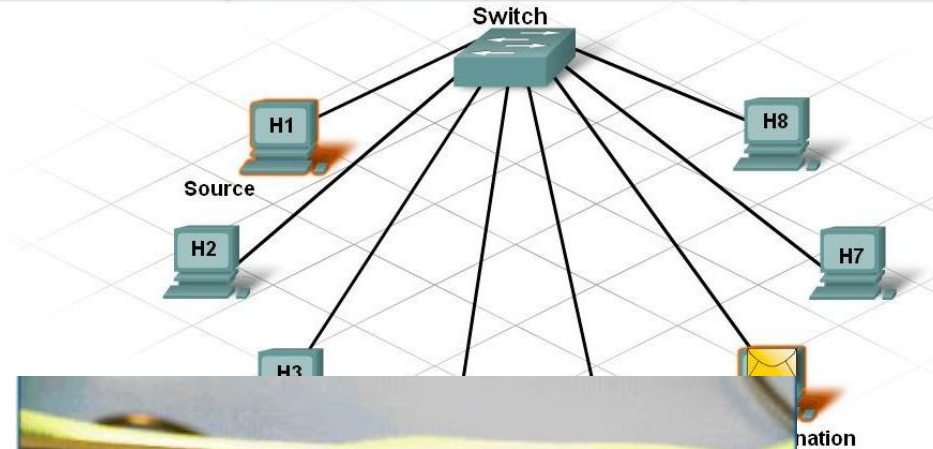


- End device
 - Computers (work stations, laptops, file servers, web servers), Network printers, VoIP phones, Security cameras, Mobile handheld devices (such as wireless barcode scanners, PDAs)
- Intermediary devices
 - Network Access Devices (Hubs, switches, and wireless access points), Internetworking Devices (routers), Communication Servers and Modems, Security Devices (firewalls)
- Services
- Medium

Hub and Switch



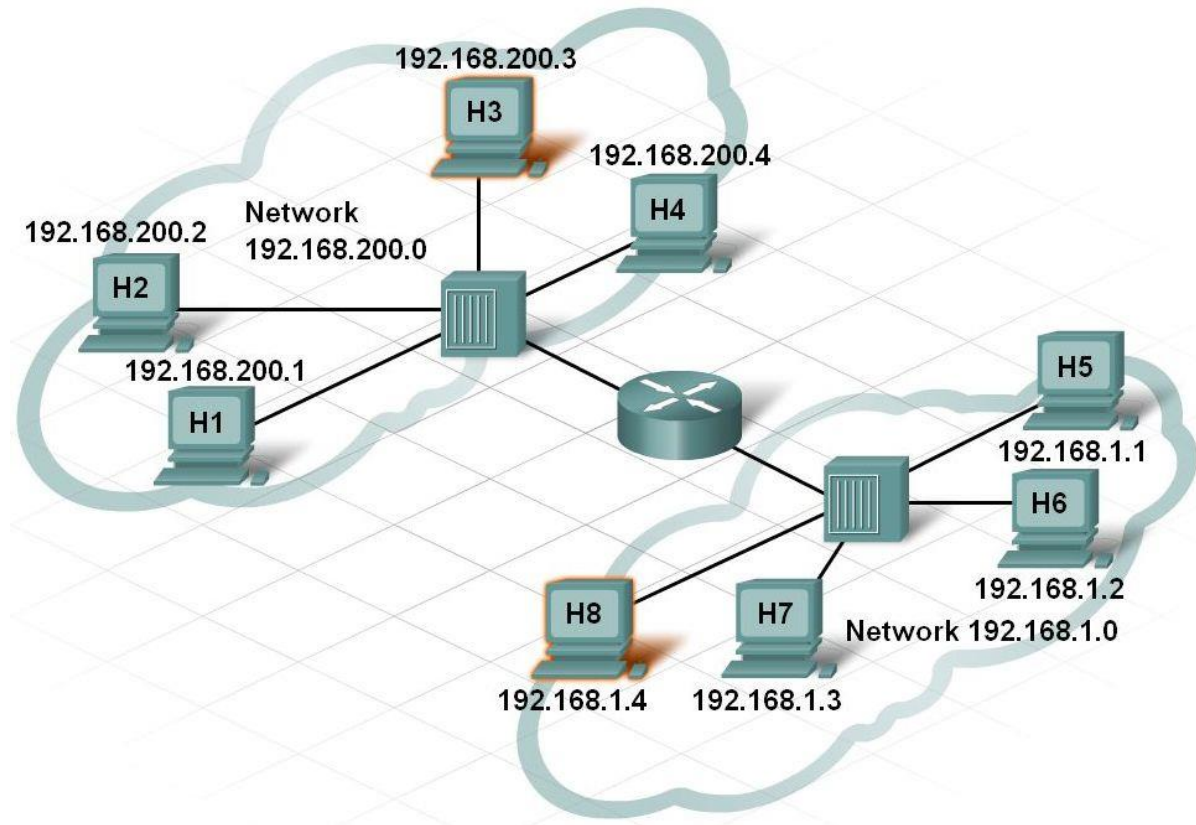
MAC Table			
fa0/1	fa0/2	fa0/3	fa0/4
260.8c01.0000	260.8c01.1111	260.8c01.2222	260.8c01.3333
fa0/5	fa0/6	fa0/7	fa0/8
260.8c01.4444	260.8c01.5555	260.8c01.6666	260.8c01.7777



Router



Router



Klasifikasi Jaringan Komputer

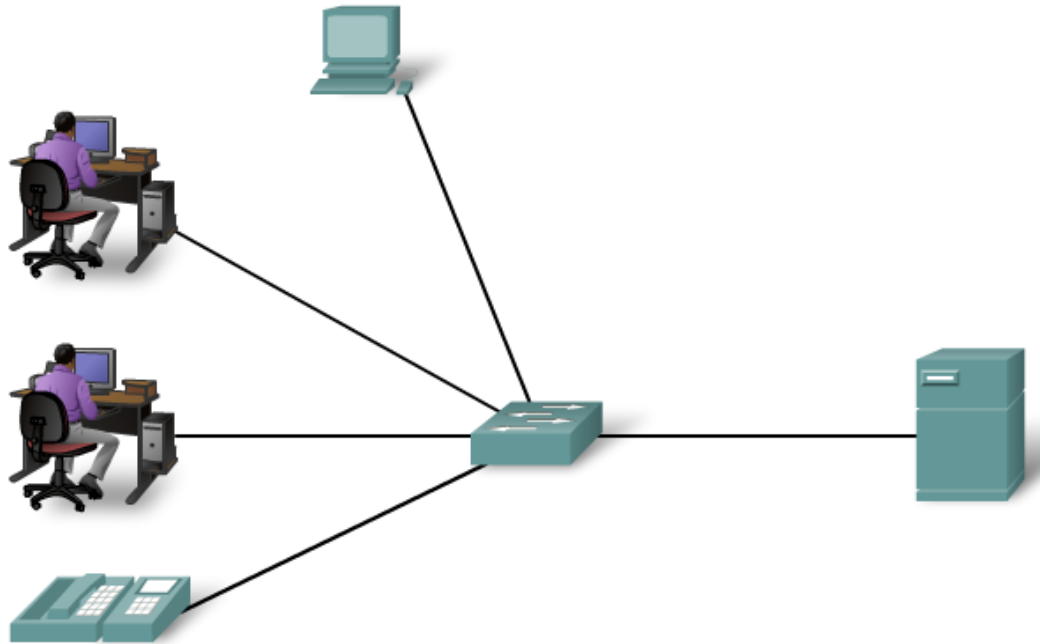


- Berdasarkan Letak Geografisnya
 - LAN, WAN, Internet
- Model komunikasi
 - Client-Server, Peer to Peer (P2P)
- Topologi
 - Bus, Star, Ring, Mesh

Local Area Networks (LANs)



A network serving a home, building or campus is considered a Local Area Network (LAN).



- Ciri-ciri infrastruktur LAN adalah:
 - Sebuah jaringan komputer yang menjangkau **satu area geografis**
 - Menyediakan **servis dan aplikasi** kepada seseorang dalam suatu struktur **organisasi yang sama**
 - Sebuah LAN biasanya di **administrasikan** oleh **satu** pengelola

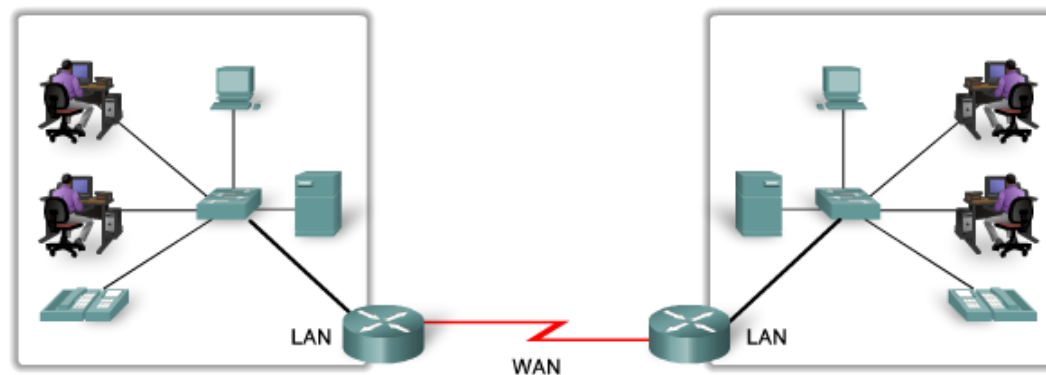
Wide Area Networks (WANs)



■ Ciri-ciri infrastruktur WAN

- Dimana bagian dari sebuah perusahaan atau organisasi dipisahkan oleh **area geografis** yang cukup **jauh**.
- Dibutuhkan sebuah **telecommunications service provider (TSP)** untuk menghubungkan beberapa LAN di beberapa lokasi yang berbeda
- WAN membutuhkan **peralatan khusus** untuk dapat mengintegrasikan beberapa Jaringan komputer lokal
 - Dikarenakan pentingnya peralatan ini, dibutuhkan **ketrampilan khusus** untuk konfigurasi, instalasi dan maintenance peralatan tersebut

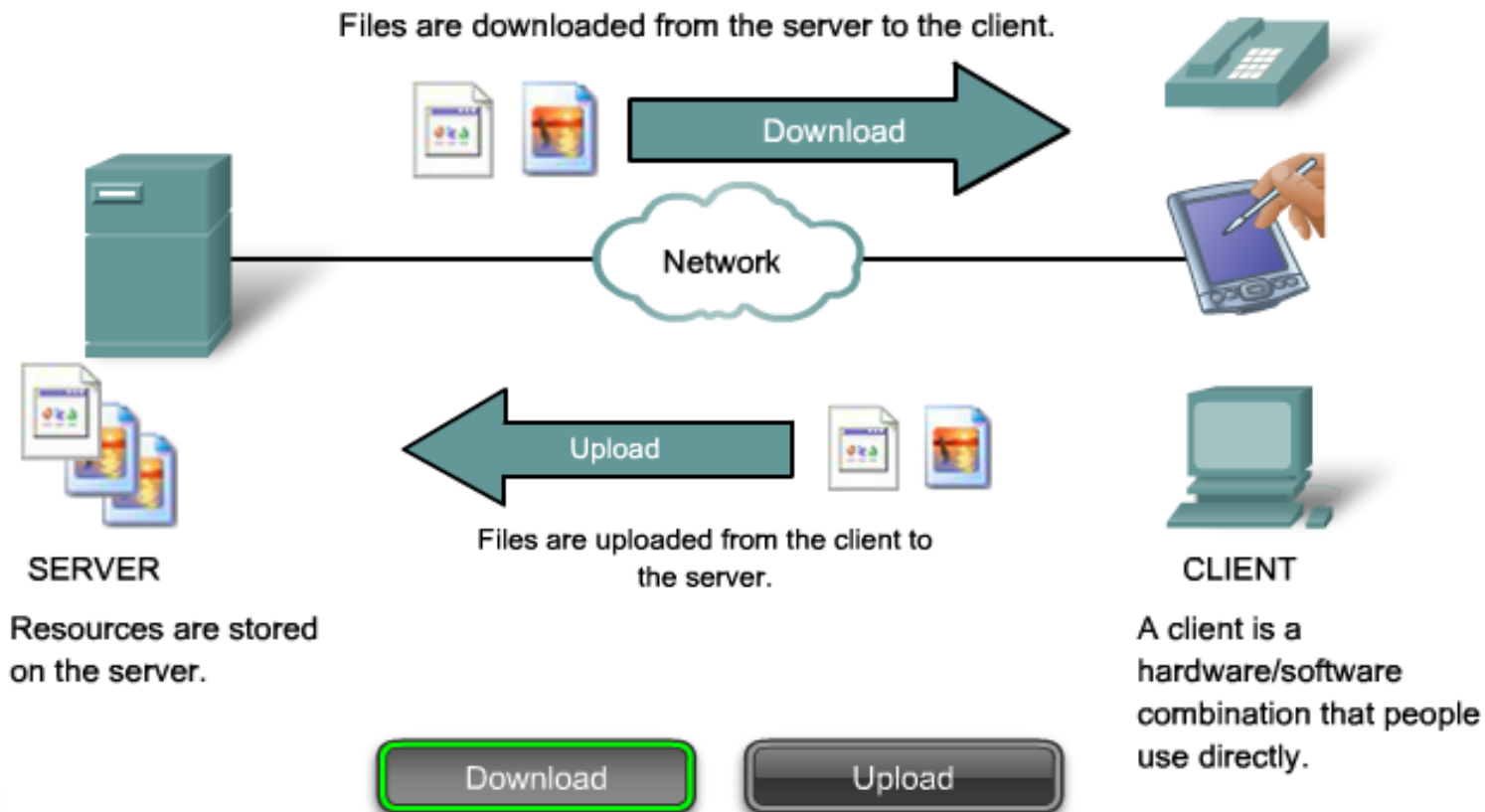
LANs separated by geographic distance are connected by a network known as a Wide Area Network (WAN).



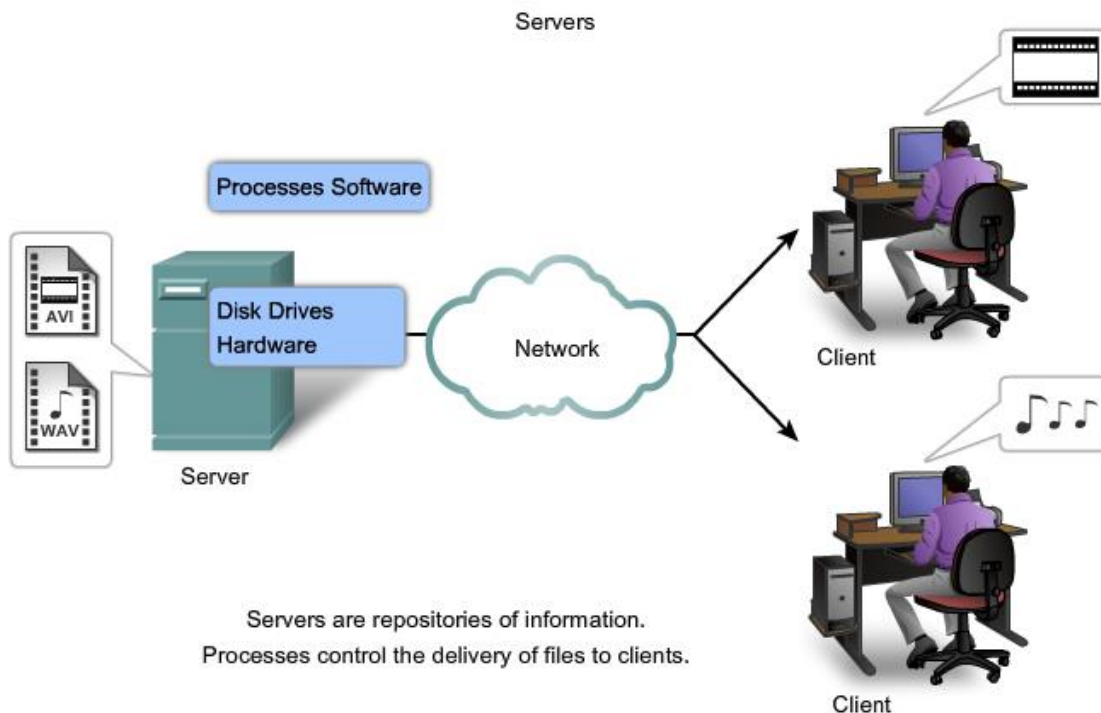
Client Server Model



Client/Server Model

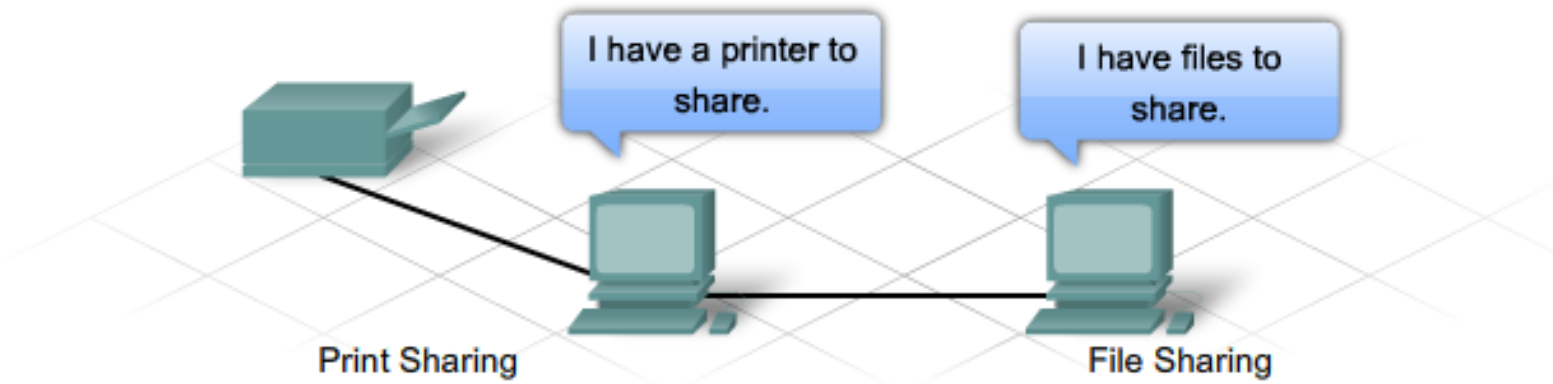


Layanan Server



- Sebuah server biasanya sebuah **komputer** berisi informasi yang **dibagikan** dengan banyak klien sistem. Contoh:
 - Web pages, documents, databases, pictures, video, and audio files
 - Network printer, the print server delivers the client print requests to the specified printer.
- Kebanyakan tipe server membutuhkan **layanan keamanan** klien agar dapat diakses, contoh:
 - autentikasi akun user

Peer to Peer Model



The advantages of peer-to-peer networking:

- Easy to set up
- Less complexity
- Lower cost since network devices and dedicated servers may not be required
- Can be used for simple tasks such as transferring files and sharing printers

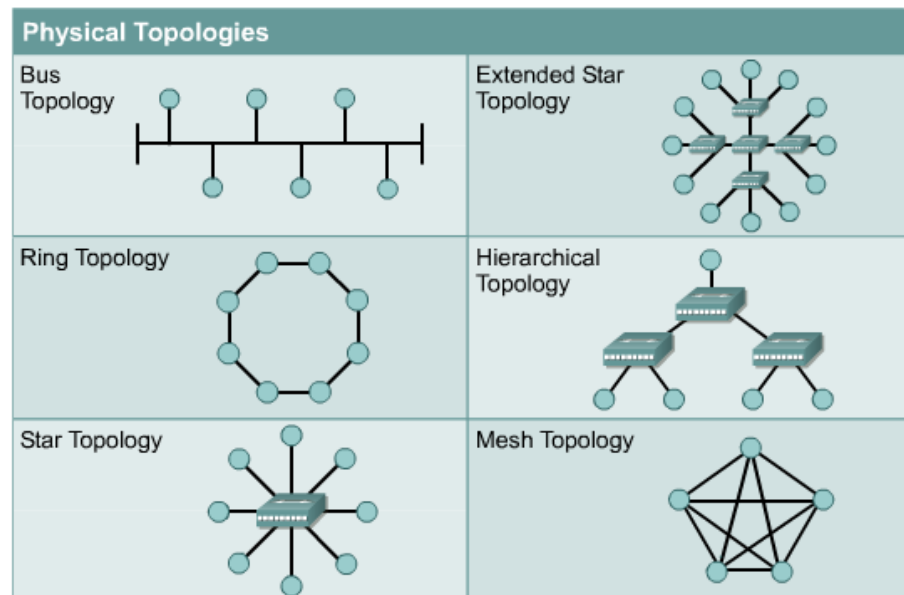
The disadvantages of peer-to-peer networking:

- No centralized administration
- Not as secure
- Not scalable
- All devices may act as both clients and servers which can slow their performance

Topologi Jaringan



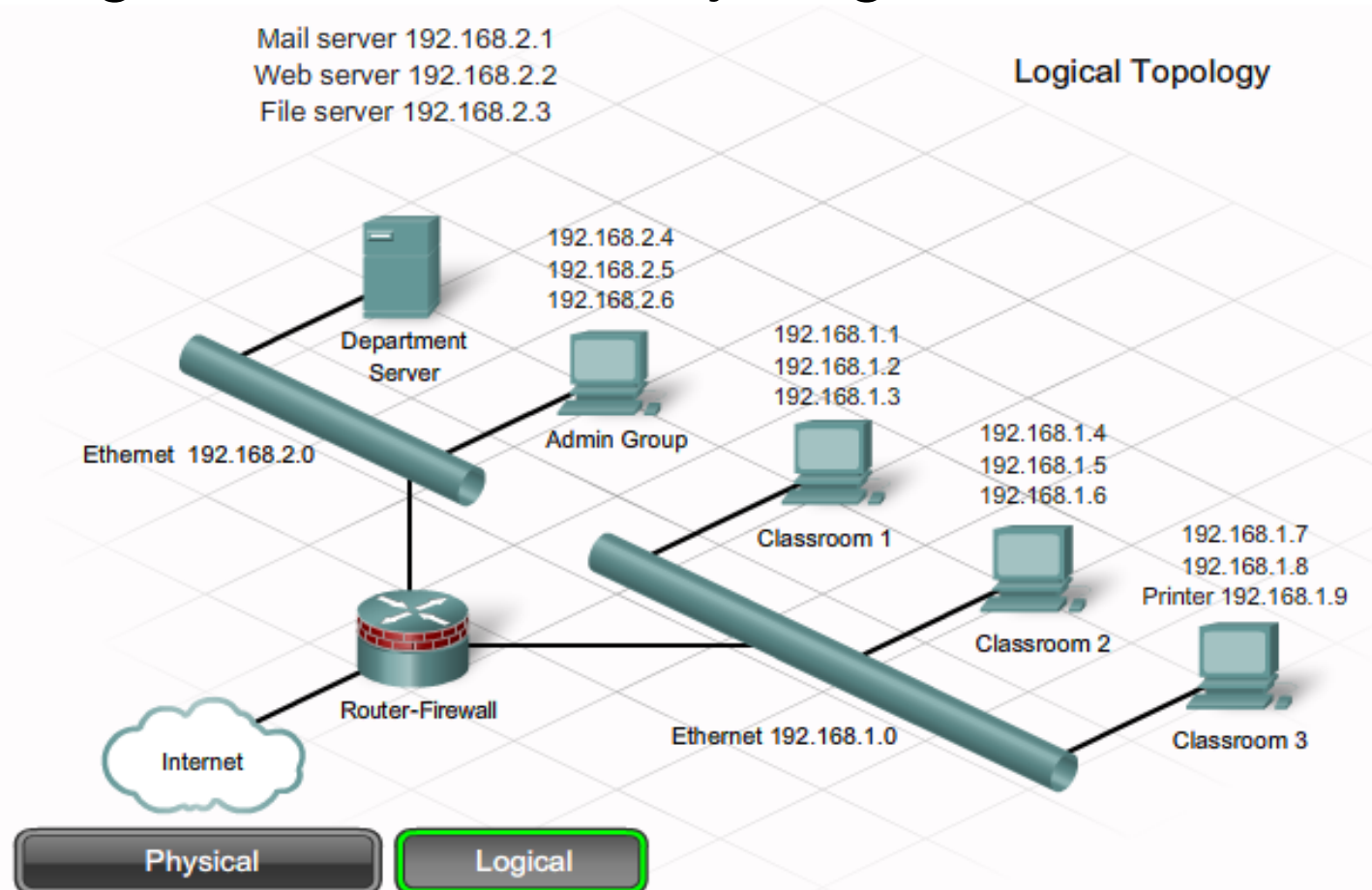
- Topologi jaringan menjelaskan bagaimana *layout* atau *gambaran* dari sebuah jaringan.
- **Menunjukkan** bagaimana perangkat jaringan **saling terkoneksi**.
- Perangkat dalam jaringan disebut dengan “**nodes**”



Logical Topology



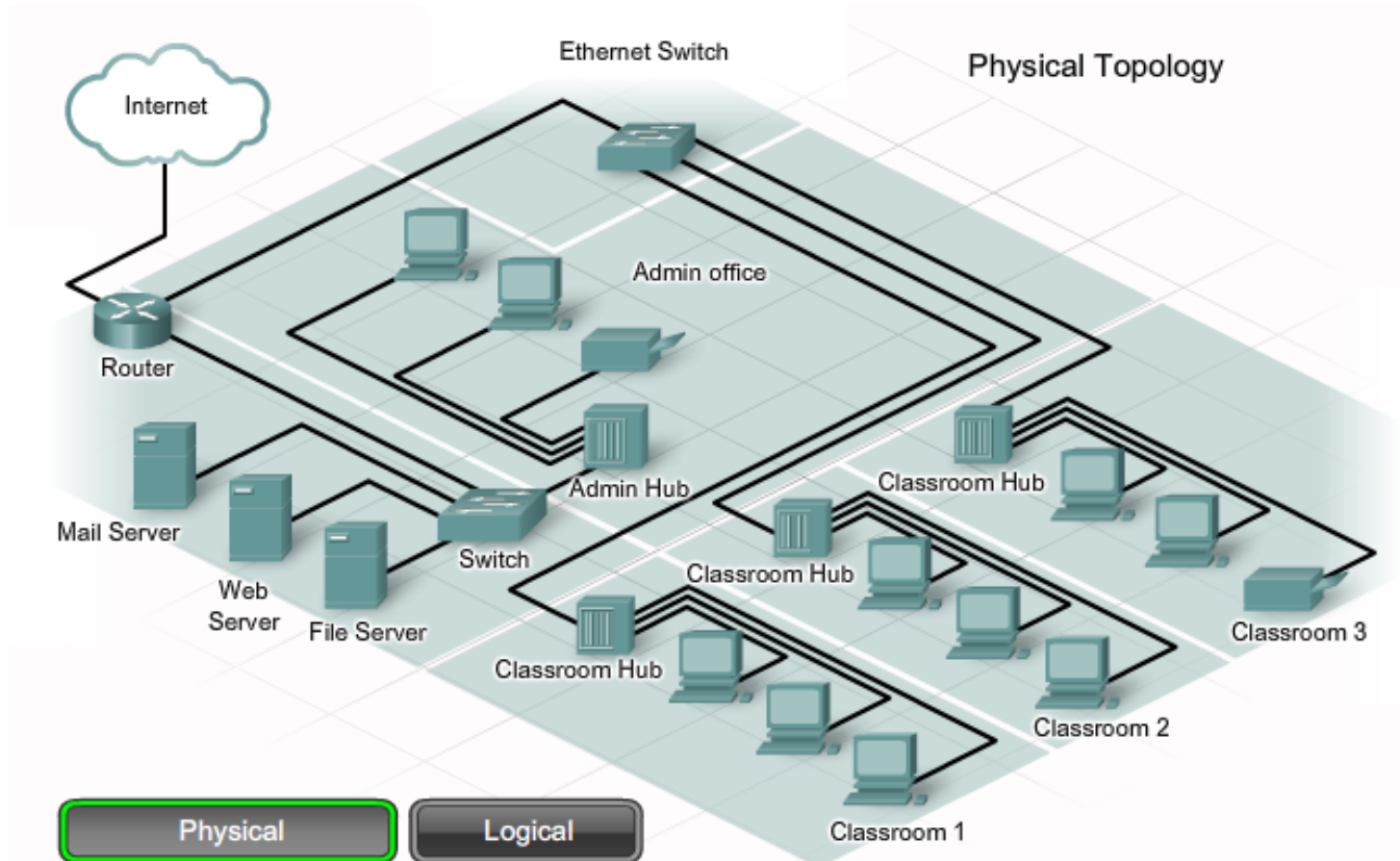
- Merepresentasikan bagaimana jalur signal dapat bergerak dalam suatu jaringan



Physical topology



- Menunjukkan keberadaan perangkat secara fisik baik media dan alat yang digunakan



Bus Topology

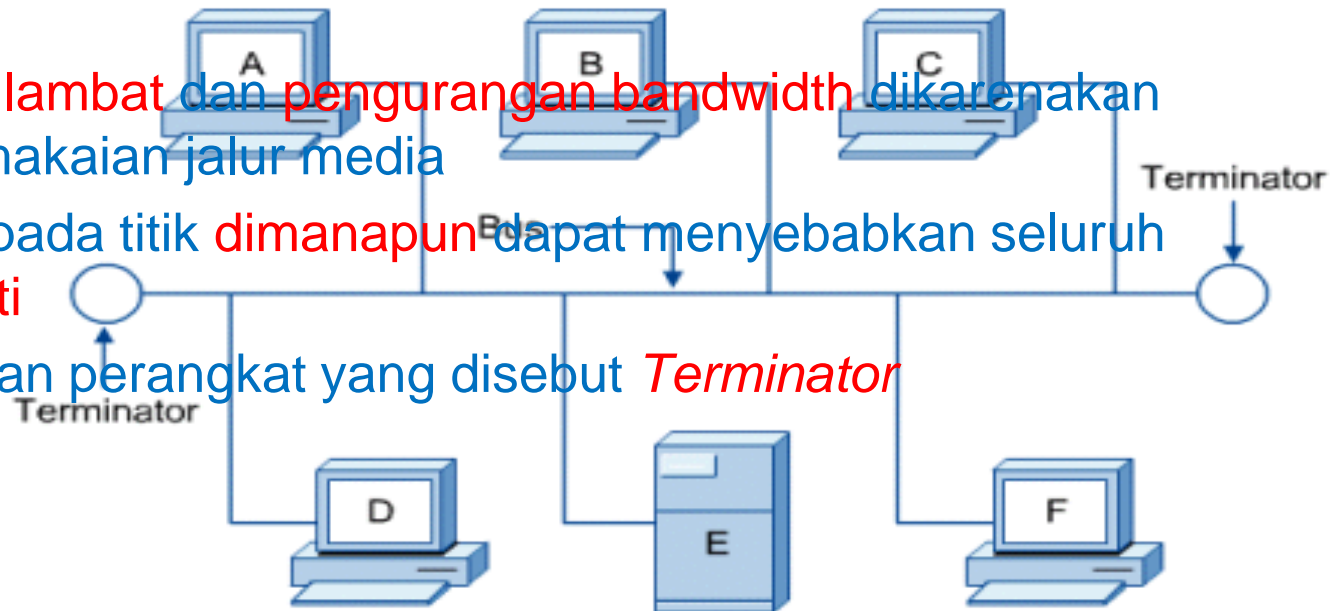


■ Keuntungan

- ❑ Menggunakan kabel lebih **sedikit** dan bekerja secara **baik** dalam lingkup jaringan yang **kecil**
- ❑ Tidak memerlukan perangkat **central** seperti hub, switch, atau router

■ Kelamahan

- ❑ Acces lebih **lambat** dan **pengurangan bandwidth** dikarenakan berbagi pemakaian jalur media
- ❑ **Kerusakan** pada titik **dimanapun** dapat menyebabkan seluruh jaringan **mati**
- ❑ Membutuhkan perangkat yang disebut **Terminator**



Star Topology

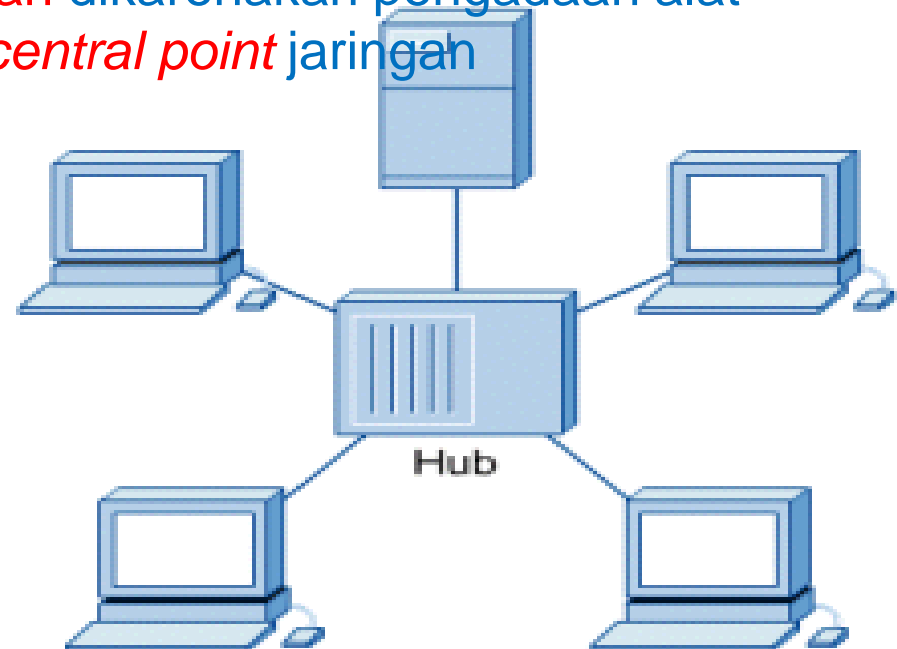


■ Keuntungan

- ❑ **Throughput** lebih baik daripada topologi sebelumnya
- ❑ **Troubleshooting** relatif lebih mudah

■ Kelemahan

- ❑ Dibutuhkan **biaya tambahan** dikarenakan pengadaan alat yang digunakan sebagai **central point** jaringan

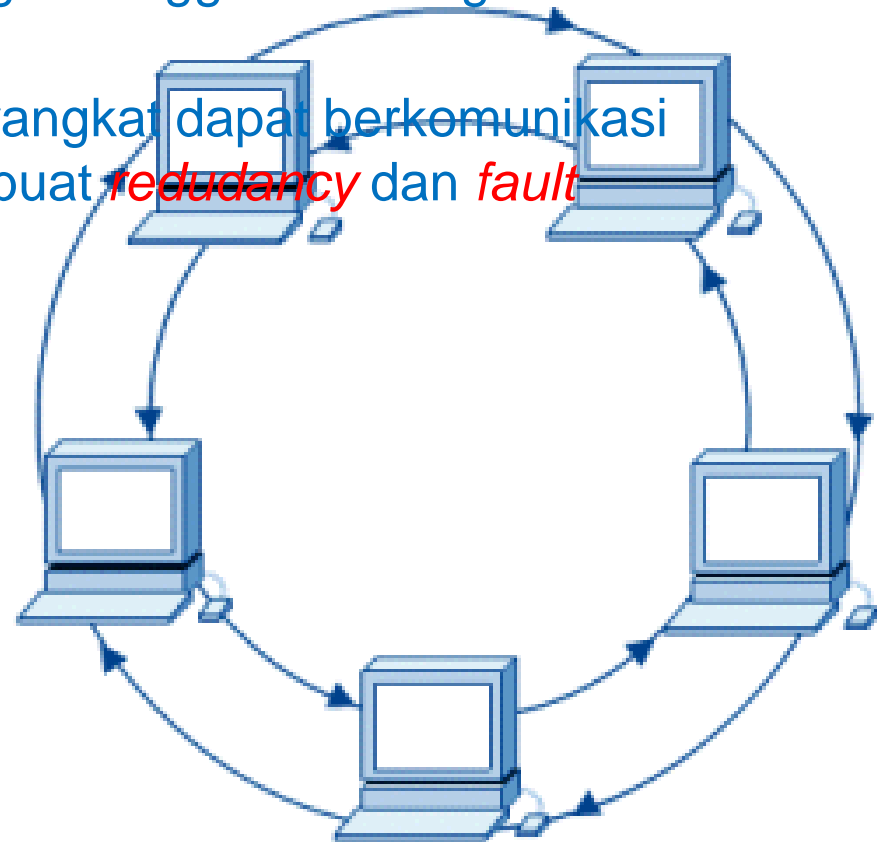


Ring Topology



■ Karakteristik

- ❑ Dengan *single ring*, seluruh perangkat dapat berkomunikasi dengan *membagi* media jaringan tunggal dan bergerak *satu arah*
- ❑ Dengan *dual ring*, seluruh perangkat dapat berkomunikasi dan bergerak dua arah (membuat *redundancy* dan *fault tolerance*)



Mesh Topology

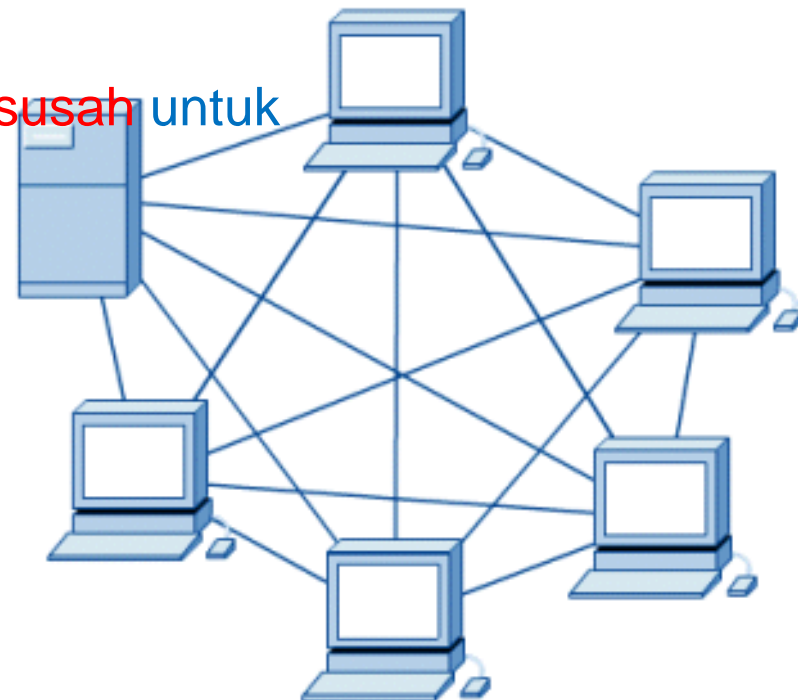


■ Keuntungan

- ❑ Topologi **Mesh** mengkoneksikan seluruh *nodes* dengan fungsi **redundancy** dan **fault tolerance**.
- ❑ Digunakan di arsitektur **wide-area networks (WANs)** untuk menghubungkan LAN dan juga untuk **jaringan vital**.

■ Kelemahan

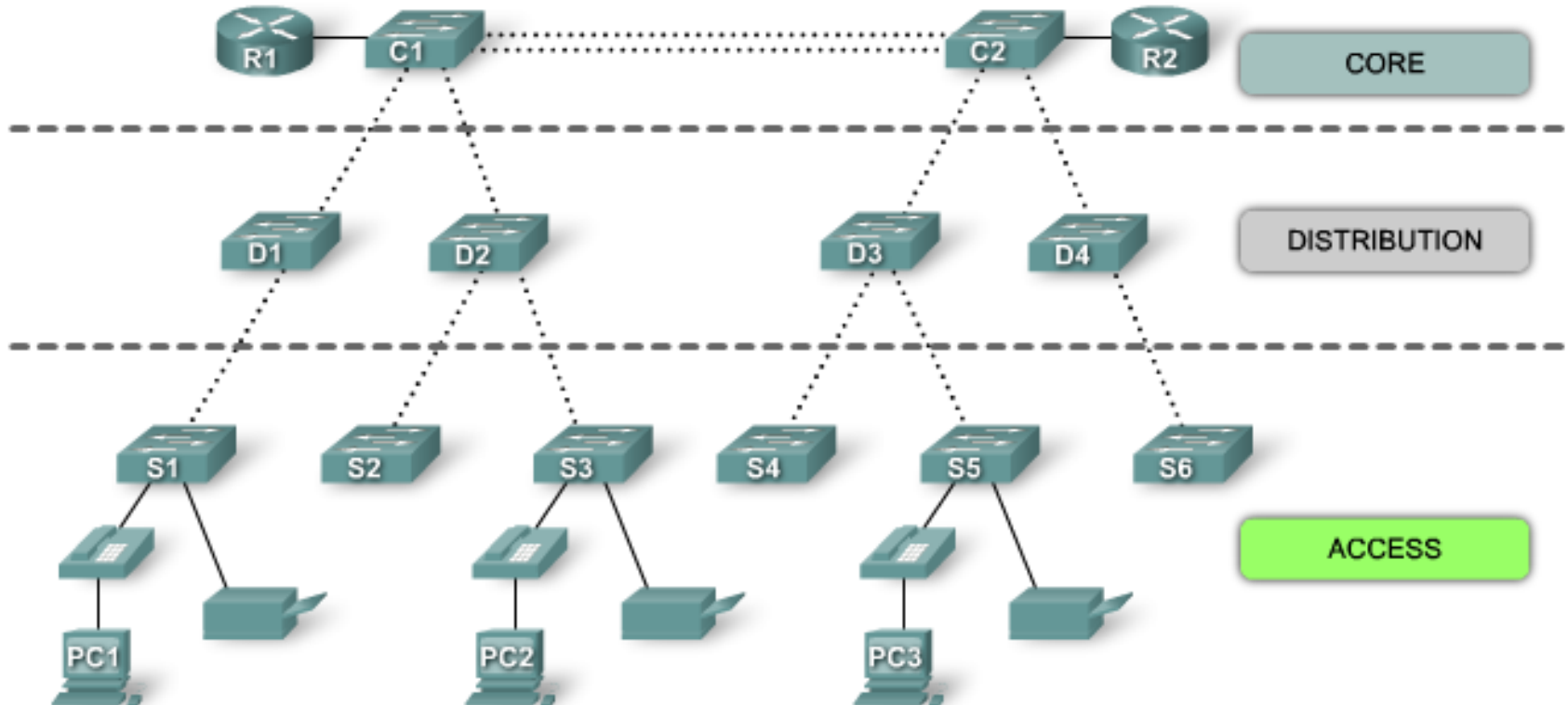
- ❑ Topologi ini jauh **lebih mahal** dan **susah** untuk diimplementasikan



Hierarchical Topology



The Hierarchical Network Model



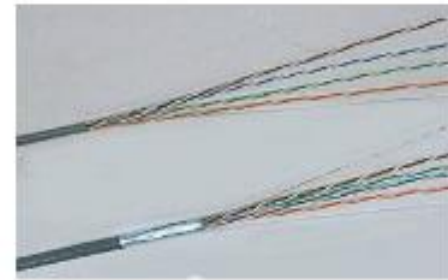
Media Jaringan



Network Media



Copper



Fiber Optics



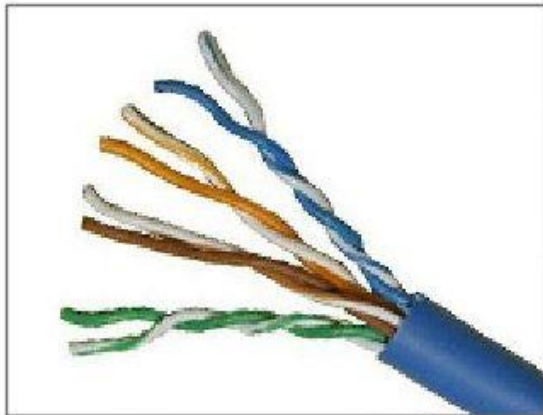
Wireless



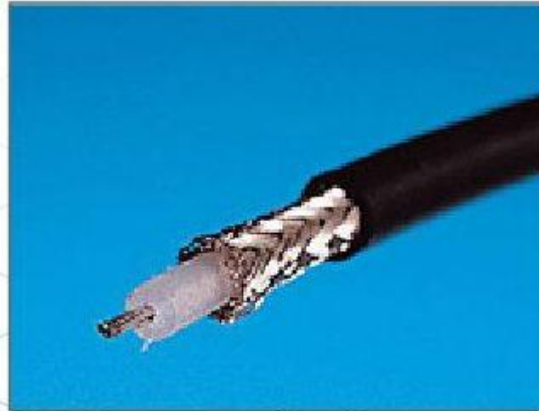
Tipe Kabel dan Konektor yang digunakan dalam Jaringan



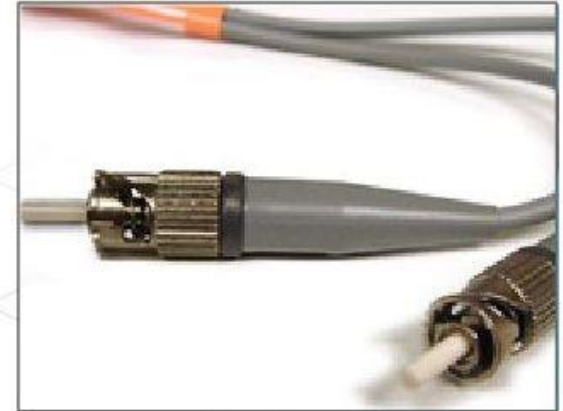
- Berikut ini beberapa tipe kabel yang sering digunakan dalam jaringan:



Twisted Pair



Coaxial Cable



Fiber Optic

Standarisasi Media Jaringan Komputer



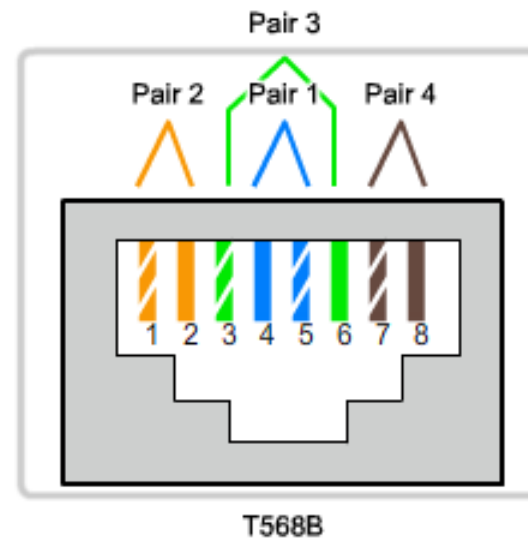
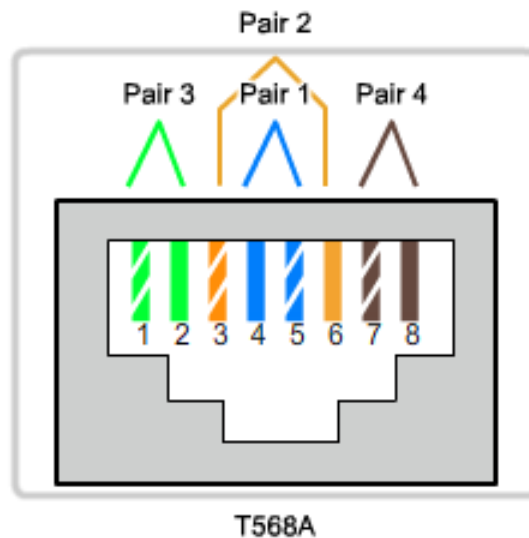
Some Typical Media	Bandwidth	Max. Physical Distance
50-Ohm Coaxial Cable (Ethernet 10BASE2, ThinNet)	10-100 Mbps	185m
50-Ohm Coaxial Cable (Ethernet 10BASE5, ThickNet)	10-100 Mbps	500m
Category 5 Unshielded Twisted Pair (UTP) (Ethernet 10BASE-T)	10 Mbps	100m
Category 5 Unshielded Twisted Pair (UTP) (Ethernet 100BASE-TX)(Fast Ethernet)	100 Mbps	100m
Multimode (62.5/125 μ m) Optical Fiber 100BASE-FX	100 Mbps	2000m
Singlemode (9/125 μ m core) Optical Fiber 1000BASE-LX	1000 Mbps (1.000 Gbps)	3000m
Wireless	11 Mbps	a few 100meters

Straight, Cross, Rollover Kabel



Straight-through, Crossover, and Rollover Cable Types

Cable Type	Standard	Application
Ethernet Straight-through	Both ends T568A or both ends T568B	Connecting a network host to a network device such as a switch or hub.
Ethernet Crossover	One end T568A, other end T568B	Connecting two network hosts. Connecting two network intermediary devices (switch to switch, or router to router).
Rollover	Cisco proprietary	Connect a workstation serial port to a router console port, using an adapter.



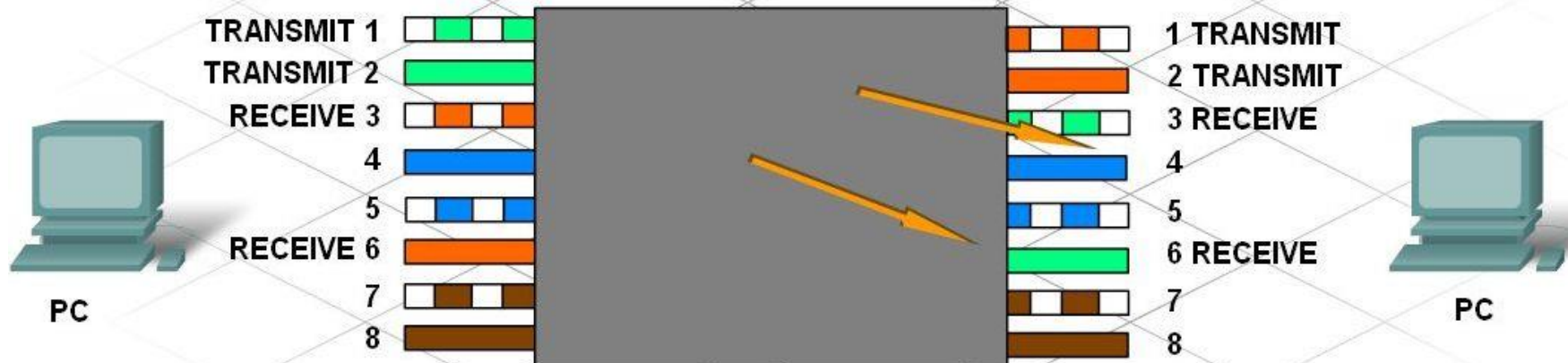
Instalasi Kabel Unshielded Twisted Pair (UTP)



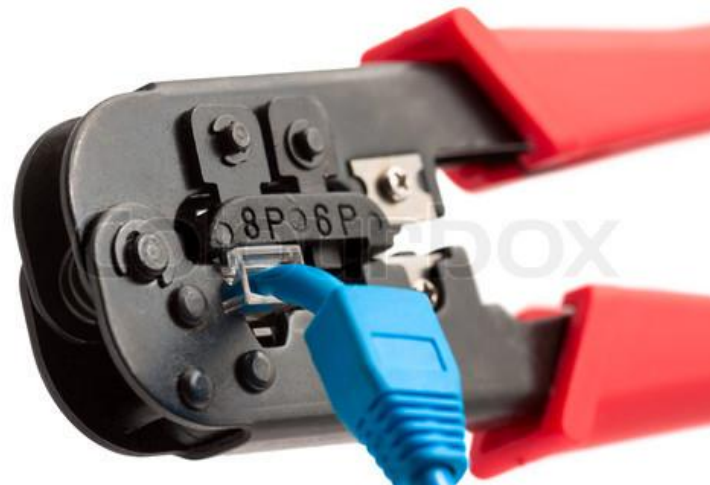
TIA/EIA 568A Straight-Through Wiring



TIA/EIA 568A Crossed Wiring



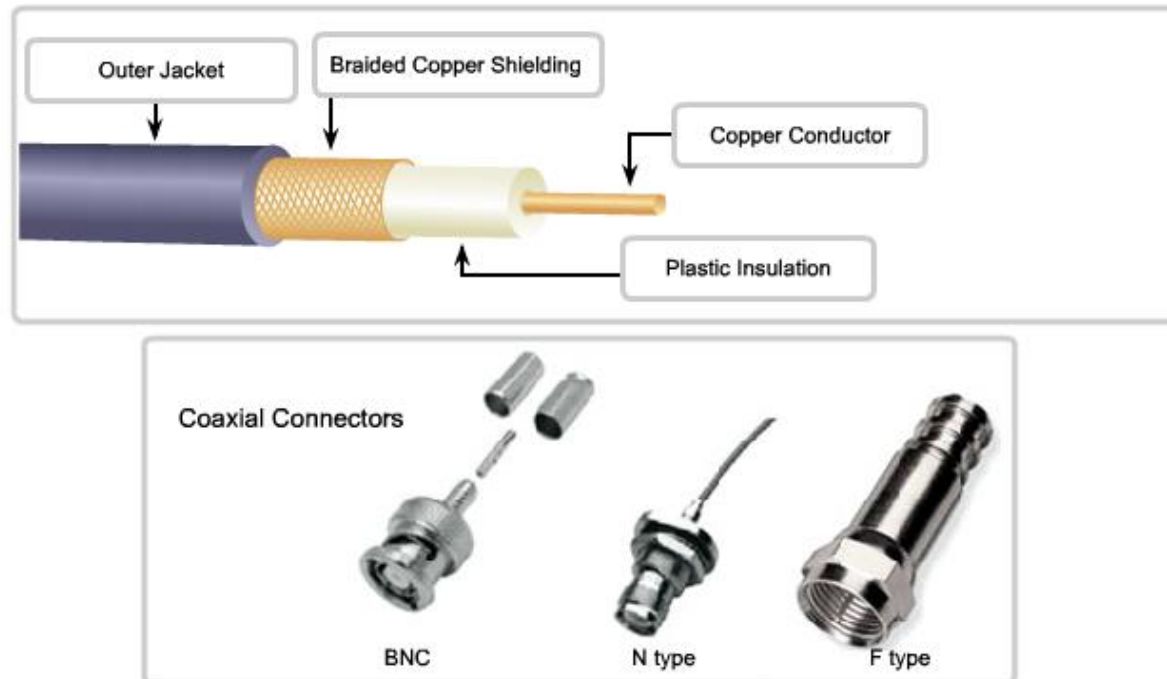
Instalasi Kabel Unshielded Twisted Pair (UTP) lanjut



Coaxial Cable

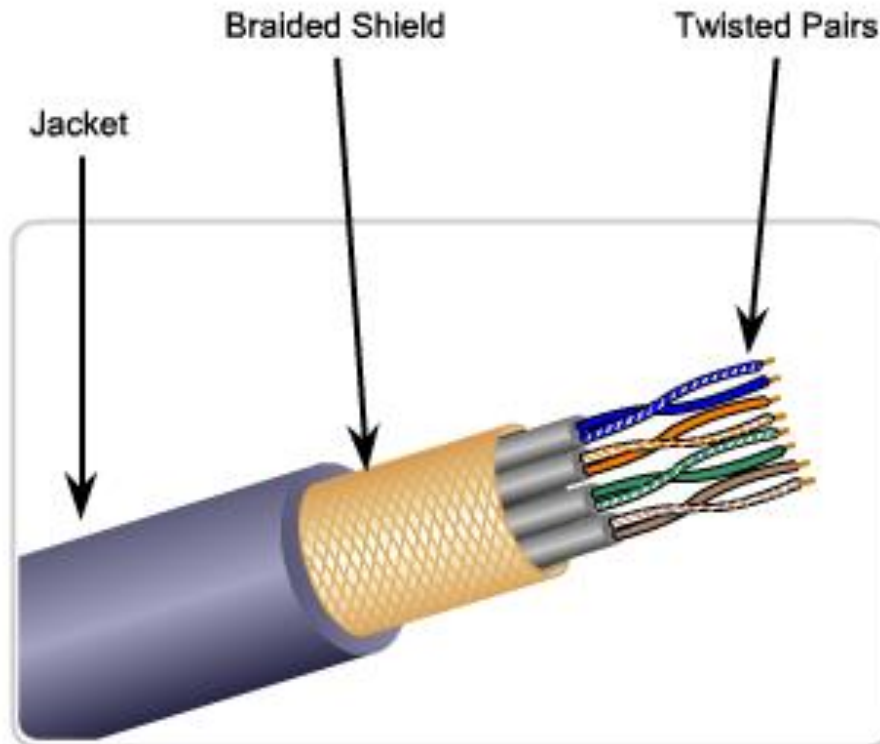


Coaxial Cable Design



- Coax kabel digunakan untuk menghubungkan **antena** ke **perangkat wireless** dan mampu menghantarkan gelombang **radio frequency (RF)**.
 - Contoh: tradisional kabel televisi

Shielded Twisted Pair (STP)

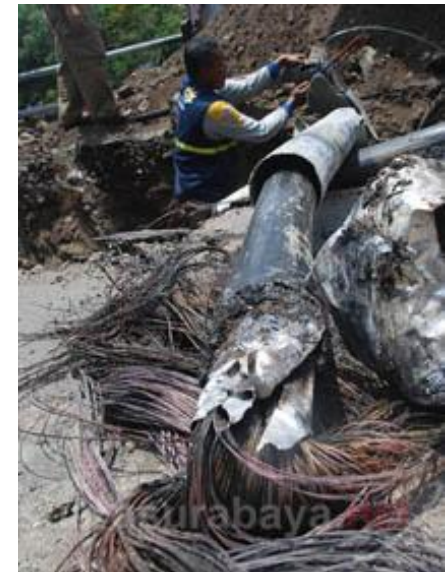
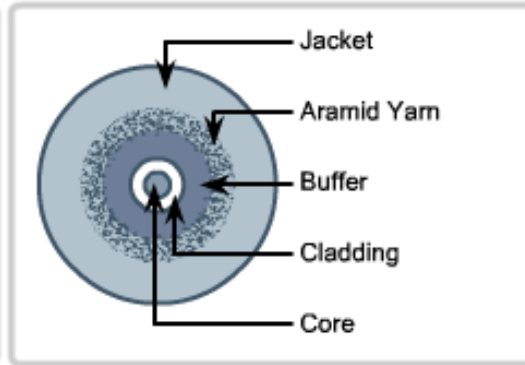
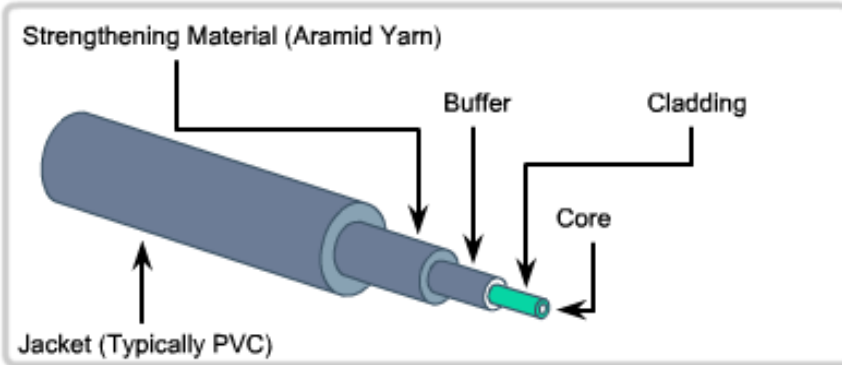


- STP memberikan *noise protection* dibandingkan UTP
- **Harga** yang lebih **tinggi** dibandingkan UTP
- Digunakan dalam instalasi jaringan **Token Ring**.
- **10 GB standard** for *Ethernet* akan menggunakan STP kabel

Fiber Optik



Fiber Media Cable Design



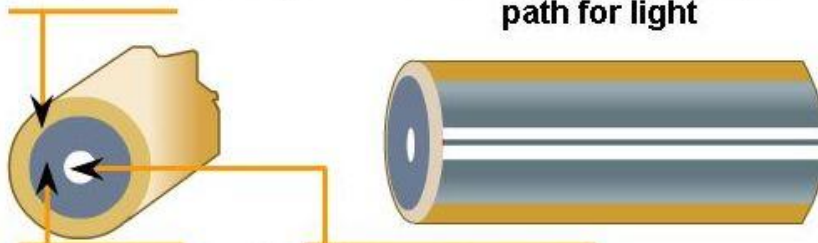
Tipe Fiber Optik



Single Mode

Polymeric coating

Produces single straight path for light



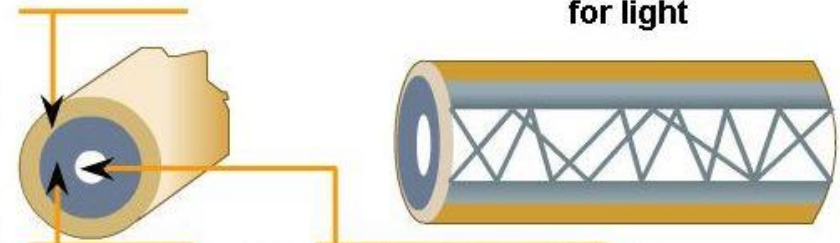
Glass Cladding 125 microns diameter

Glass Core=9 microns

Multimode

Coating

Allows multiple path for light



Glass Cladding 125 microns diameter

Glass Core=50/62.5 microns

- Small Core
- Less Dispersion
- Suited for long distance applications
- Uses lasers as the light source
- Commonly used with campus backbones for distances of several thousand meters

- Larger core than single mode cable
- Allows greater dispersion and therefore, loss of signal
- Suited for long distance applications, but shorter than single mode
- Uses LEDs as the light source
- Commonly used with LANs or distances of a couple hundred meters within a campus network

Kabel Tester (Pengujian)



Cable Tester



Cable Certifier



Multimeter

Media Wireless



Gangguan Media Transmisi



External Interference with Copper Media



Sources of interference to data signals on copper media



Fluorescent lighting



Radio waves



Electric motors

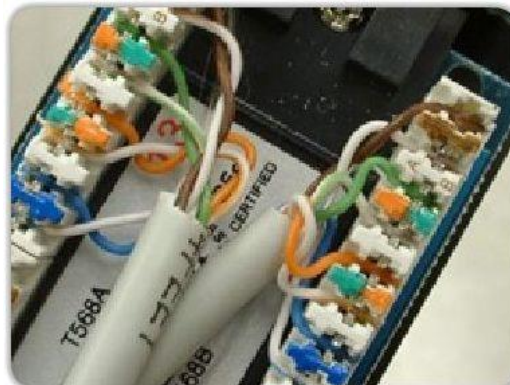
Pengamanan Membangun Jaringan



Front of Patch Panel



Rear of Patch Panel



Close Up of Back of Patch Panel



Punchdown Tool

Pengamanan Membangun Jaringan



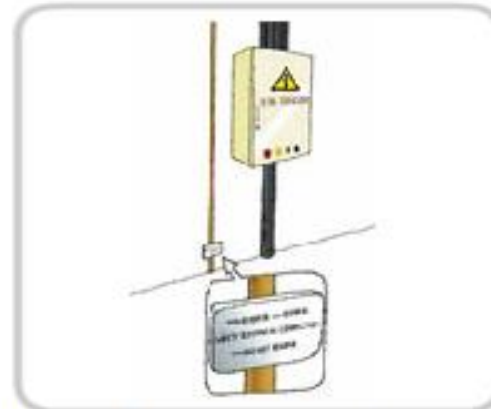
The separation of data and electrical power cabling must comply with safety codes.



Cables must be connected correctly.



Installations must be inspected for damage.



Equipment must be grounded correctly.

