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In-Store Network Design

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Agenda

- Business drivers for stores today
- IT and Network drivers for stores today
- Trends of store network technologies
- WAN Choices/Progression
- In-store network components
- General Store Network Design Guidelines
- Specific Design Guidelines
- In-Store Networking Examples





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Business Drivers for Stores Today

- Store chain size dynamics
- Store physical size
- Store appearance is becoming more important
 - ▶ Cost of basic versus cosmetic store changes
- Extended store operating hours
- e-commerce and e-business integration
- Globalization

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IT and Network Drivers for Stores Today

- Cost of IT support for store
- Cost of IT physical facilities
 - ▶ Store network wiring
- Standards
 - ▶ Store formats
 - ▶ "Store Manufacturing"
- Changing business models
 - ▶ Store "Push" vs "Pull"
 - ▶ Increased application access to and from store
 - ERP, supply chain, CRM, intranet/internet
- Multimedia/Kiosks
- Wireless





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Trends of Store Network Technologies

- LAN Technology
 - ▶ Ethernet vs. Token Ring, hub vs. switch
- Java and other graphical software interface technologies are starting to become common
 - ▶ Web browser is emerging as a universal terminal interface
 - ▶ Increased network traffic
- More non-IT devices are becoming network enabled
 - ▶ Security, scales, environmentals, telephony
 - ▶ Mobile & hand-held devices are proliferating (wireless)

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WAN Choices/Progression

- For WAN connectivity it's really a progression
 - ▶ Single dial-up connection
 - ▶ Re-use or multiplex over single dial connection - Harmonics is the prime example of this
 - ▶ ISDN connectivity
 - ▶ Virtual Private Networking via dial
 - Main drawback is that it must be initiated from the store
 - ▶ Frame Relay connection
- Leased lines are going away (rapidly)
- VSAT is a possibility, but slowly decreasing numbers other than for broadcast video or music
- xDSL is promising - quicker in US





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In-Store Network Components

- The In-Store Network is a Local Area Network
 - ▶ Ethernet (IEEE 802.3)
 - Wiring is TIA Category 5
 - Enhanced Category 5 for Gigabit Ethernet
 - ▶ Legacy History
 - Mix of IBM Store Loop, direct connect and LAN networks
- Components that make up the in-store LAN
 - ▶ Adapter
 - ▶ Hub
 - ▶ Switch
 - ▶ Router

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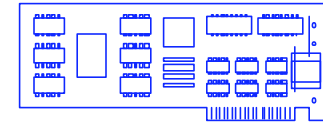
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What is an Adapter?

- An adapter is a card that can allow a device to attach to the in-store LAN network
- Adapter hardware usually follows industry standards
 - ▶ ISA for older equipment
 - ▶ PCI for newer equipment
 - ▶ PCMCIA for small form factors (laptops, handhelds)
- IBM POS provide the adapter in the base hardware unit (IBM SurePOS 700 Series, IBM 4694, IBM 4695, IBM SureOne)
 - ▶ Ethernet LAN adapter provided on the motherboard
- Adapters are used to connect any device to the LAN
 - ▶ Workstations, servers, time clocks and even meat slicers!

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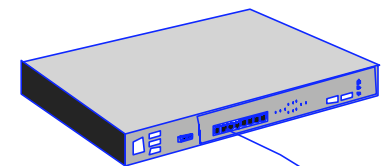
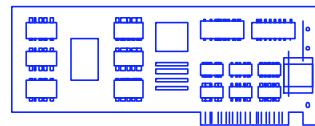
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What is an Ethernet Hub?

- An Ethernet Hub is a device that allows for connecting various LAN cards into a single in-store LAN using a common set of wiring
- Hubs can optionally be managed remotely
- Hubs have different numbers of ports
 - ▶ Stacking feature
 - ▶ Redundant links



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What is an Ethernet Switch?

- An Ethernet Switch is a network device that allows for high-speed communications between devices in the store.
 - ▶ Provides dedicated bandwidth to each attached device
 - ▶ Useful when too many devices are located on a LAN or if there are large amounts of data to be transferred between devices, a LAN switch ensures good, consistent network performance
 - ▶ Link aggregation, VLAN



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What is a Router?

- A router is a network device that allows for store devices attached to the in-store LAN, such as controllers and PCs, to communicate to devices in other locations
 - ▶ Unless configured as a bridge also, broadcast traffic will not traverse the router
- Different store sizes and network needs will be solved by different router features and models
 - ▶ Dial back-up for failure of primary WAN connection

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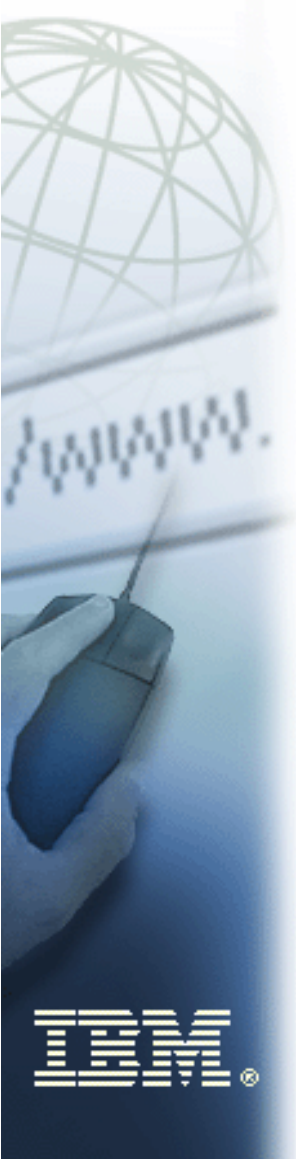
General Store Network Design Guidelines

- Invest in best physical facilities
 - ▶ Engineers can't bury their mistakes
- LAN in the Store
 - ▶ Ethernet market share
 - ▶ Switching vs. sharing, segmenting
- Applications come first
- Fewer tiers
- Total Cost of Ownership
 - ▶ Test, benchmark, pilot, roll-out, life cycle
- Map business and application requirements to carrier offerings

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Supermarket, Mass Merch., and Department Stores





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Design Guidelines

- First evaluate application mix in the store, bandwidth requirements, and distances involved
 - ▶ For normal check-out functions, utilize 10 Mbps Ethernet
 - ▶ For high bandwidth applications, such as multimedia, some kiosk or server applications, utilize switched Ethernet or 100 Mbps Ethernet
 - ▶ Multimode fiber if large distances involved
- Normal check-out registers - max. 32 devices per segment if using hubs
 - ▶ Switching should be used in large store environments or where you need to mix 10 Mbps and 100 Mbps Ethernet

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Design Guidelines

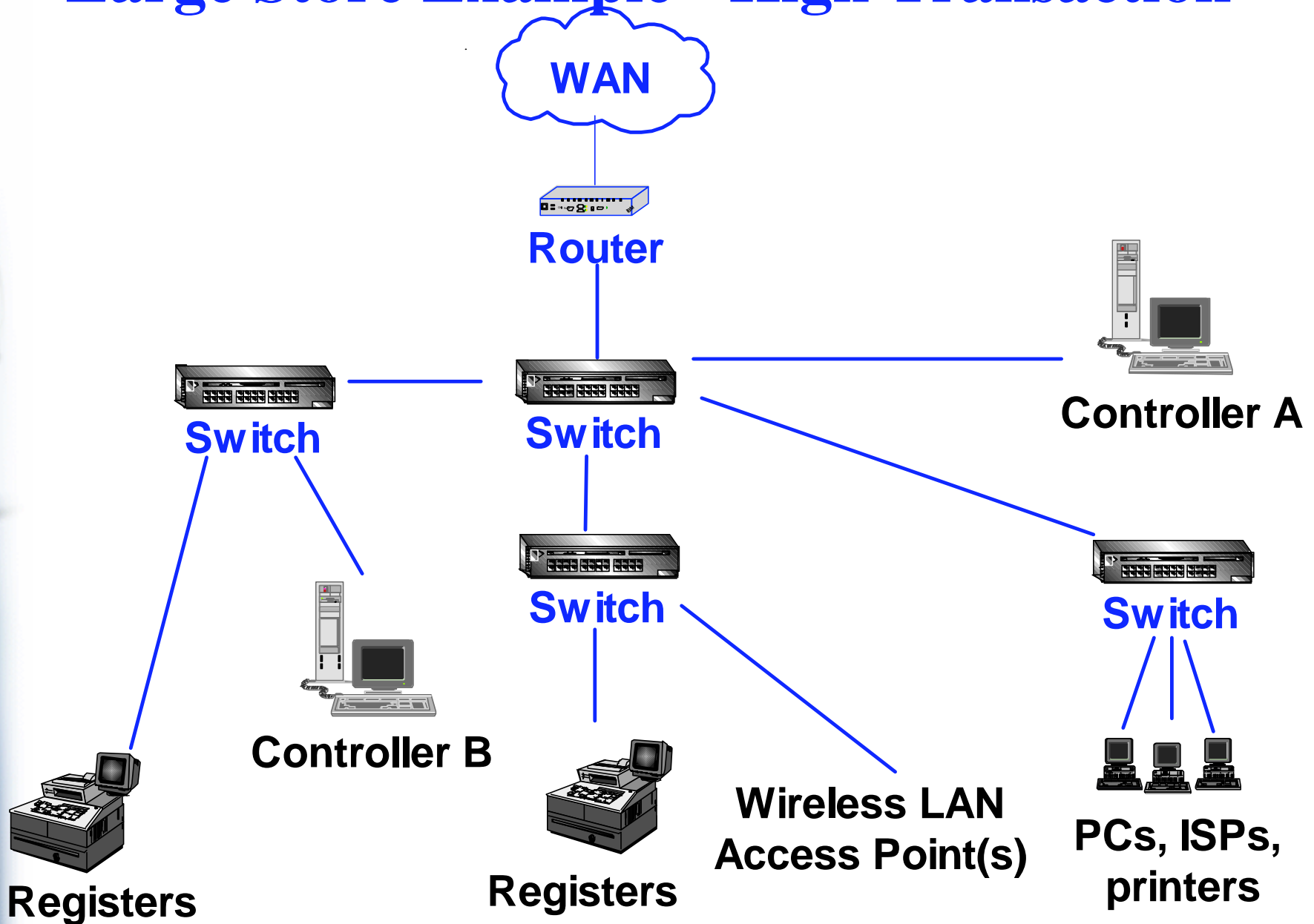
- Dual in-store controllers/servers
 - ▶ Put on separate hubs/switches
 - ▶ Minimum 2 hubs/switches to avoid single point of failure
- Register to hub/switch failure analysis
- Separate out back office functions if possible
- Back-up WAN connection available for credit, check authorization
- Minimize number of wiring closets
- Use single hub/switch model in store
- Wireless for seasonal fluctuation, frequent moves





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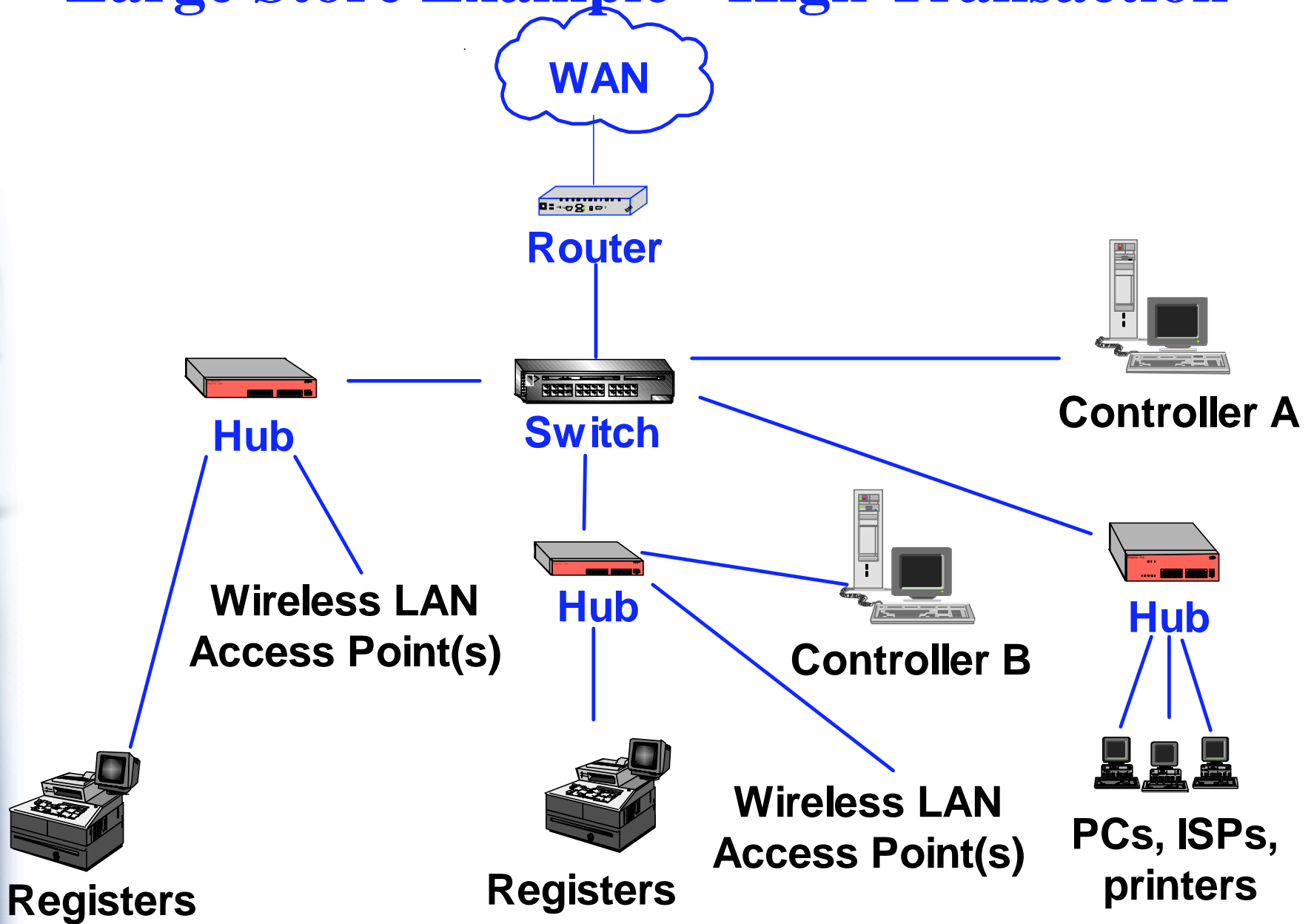
Large Store Example - High Transaction





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Large Store Example - High Transaction



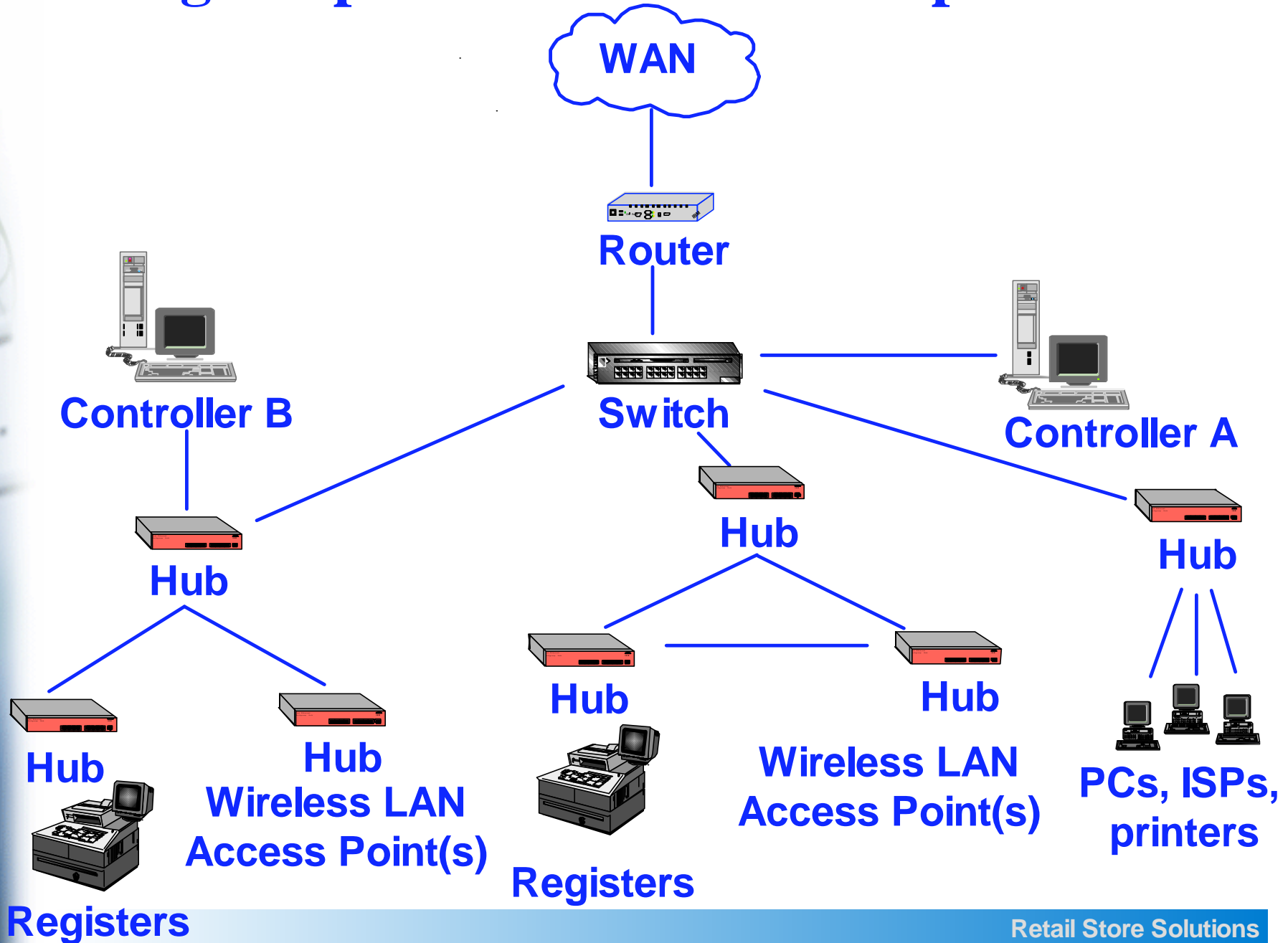
Registers

Registers



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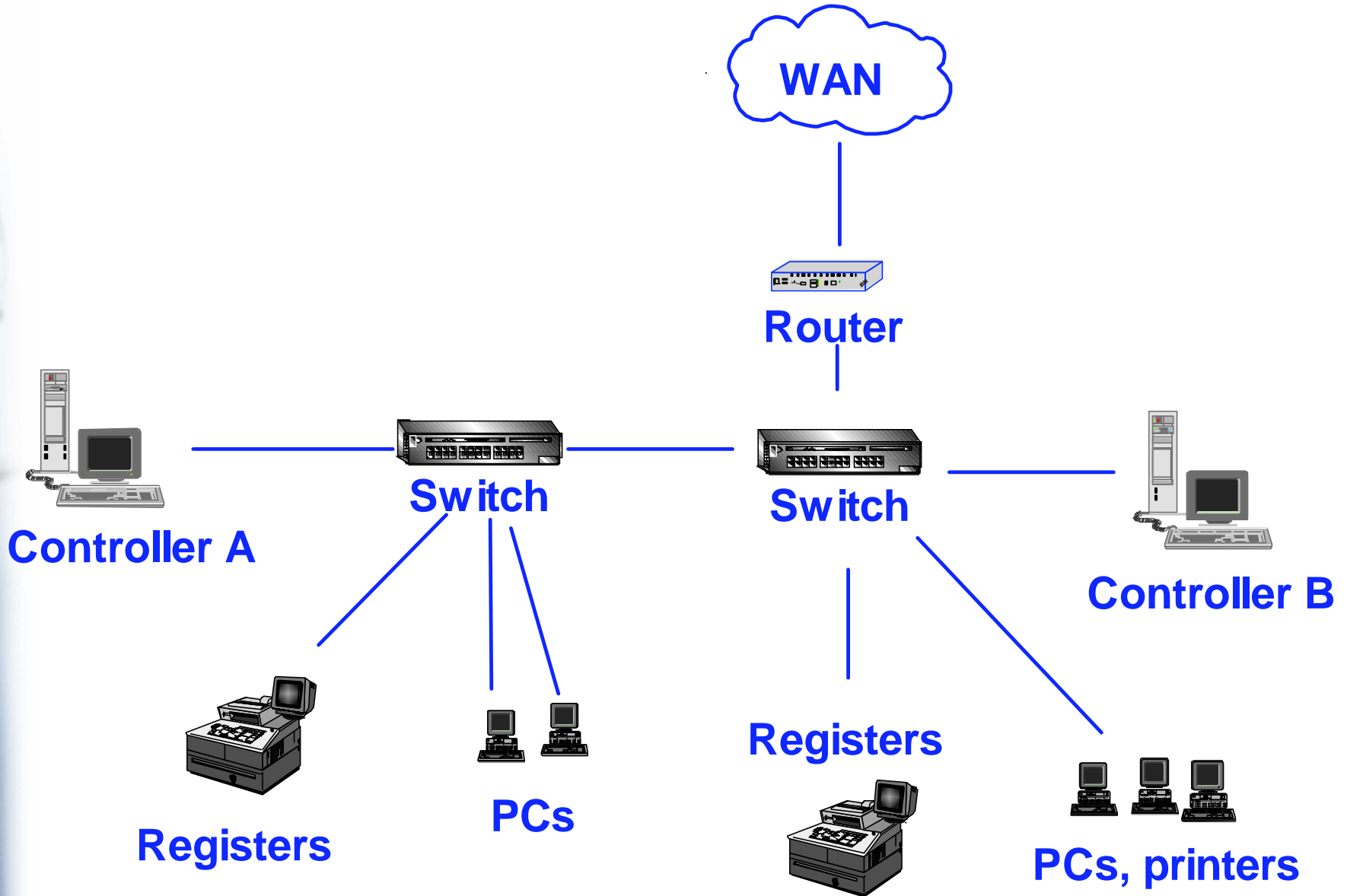
Large Department Store Example





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Small Store Example





Specialty and Food Service





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Design Guidelines

- First evaluate application mix in the store, bandwidth requirements, and distances involved
 - ▶ For normal check-out functions, utilize 10 Mbps Ethernet
 - ▶ For high bandwidth applications, such as multimedia, some kiosk or server applications, utilize switched Ethernet or 100 Mbps Ethernet
 - ▶ Multimode fiber if large distances involved (very infrequent)
- Due to price points and size of store, evaluate 100% switched environment

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Design Guidelines

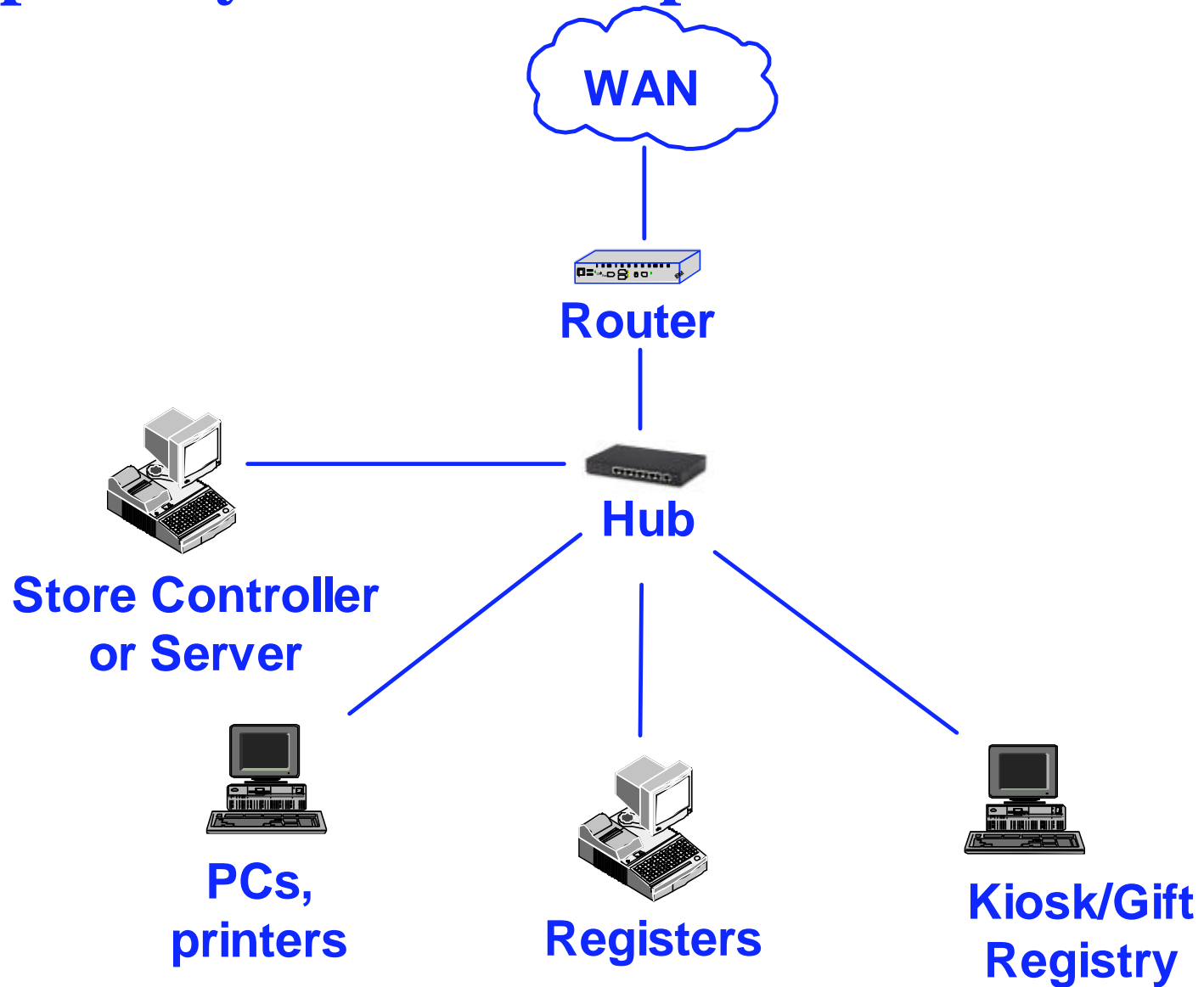
- Try to utilize a single location for the hub, router, and any other data networking equipment
- Look for most cost-effective WAN alternative
 - ▶ Router vs Controller or Server
 - ▶ Look to a WAN/VAN connection if there are a large number of stores in the chain
 - ▶ Enable software distribution - especially if Windows NT or AIX is in the store, or if other I/T equipment is in the store
- Enable credit authorization from a central site - save \$\$\$
- If registers are constantly being moved and only limited bandwidth is required, consider 100% wireless store

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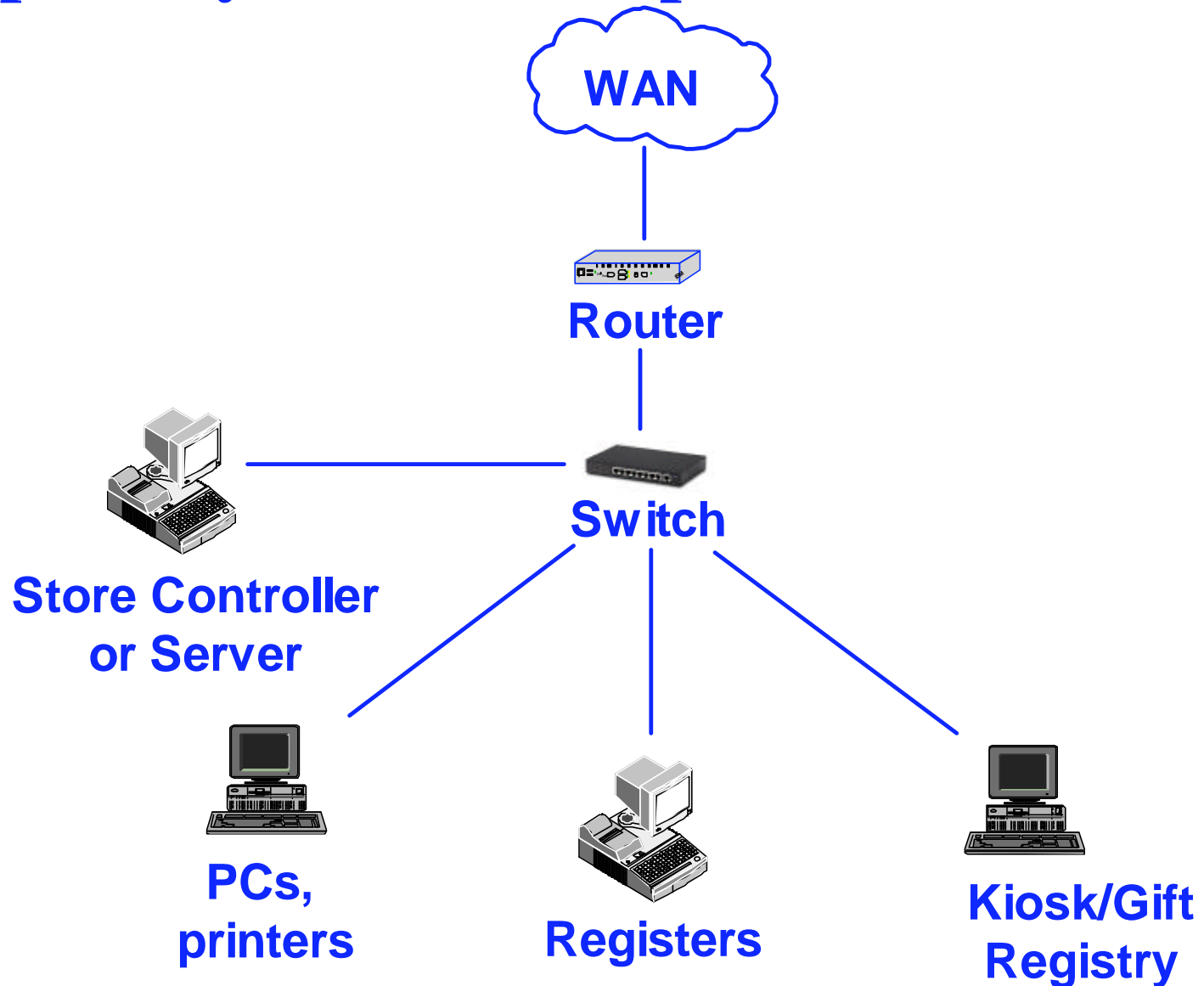
Specialty Store Example w/o Multimedia





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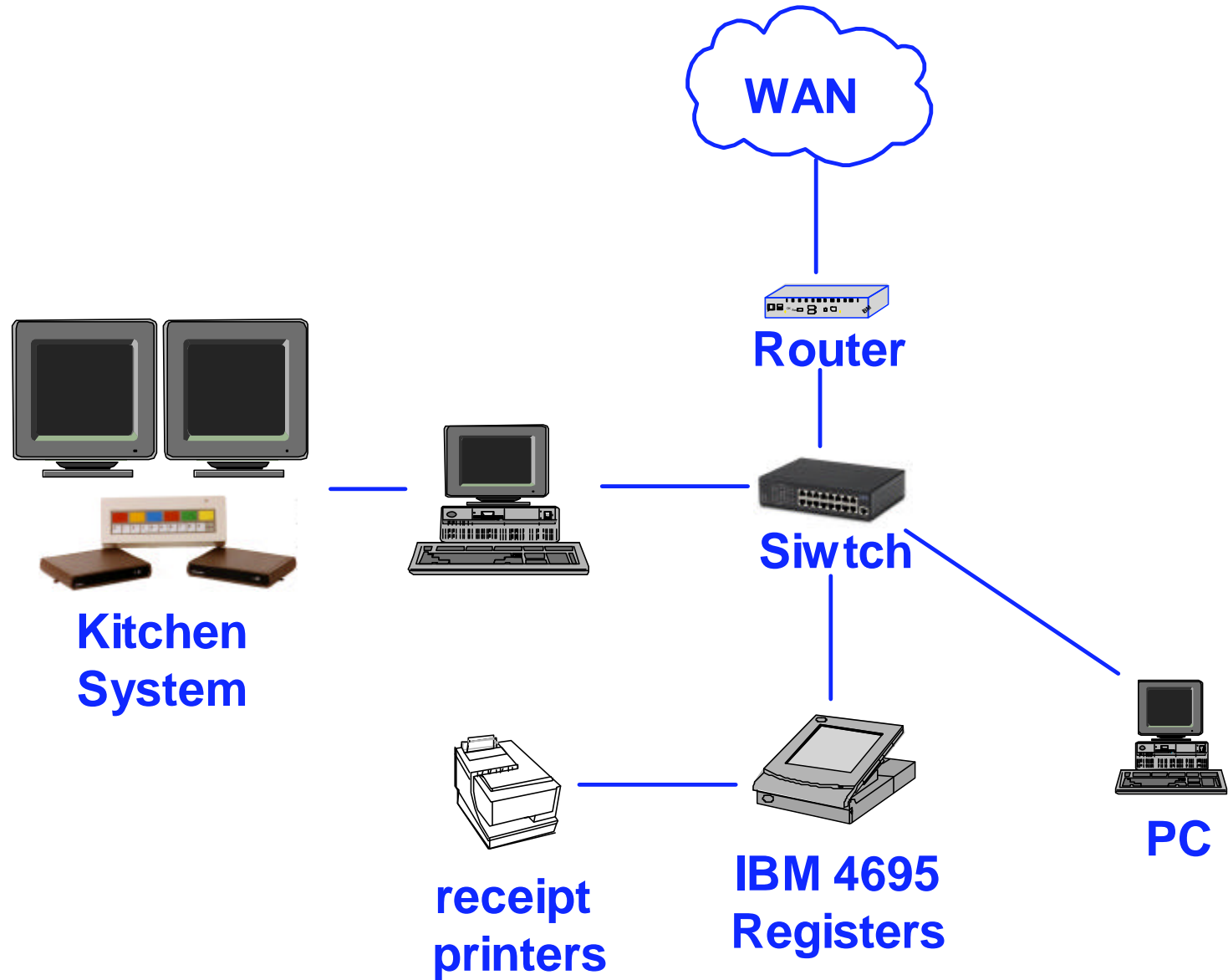
Specialty Store Example with Multimedia





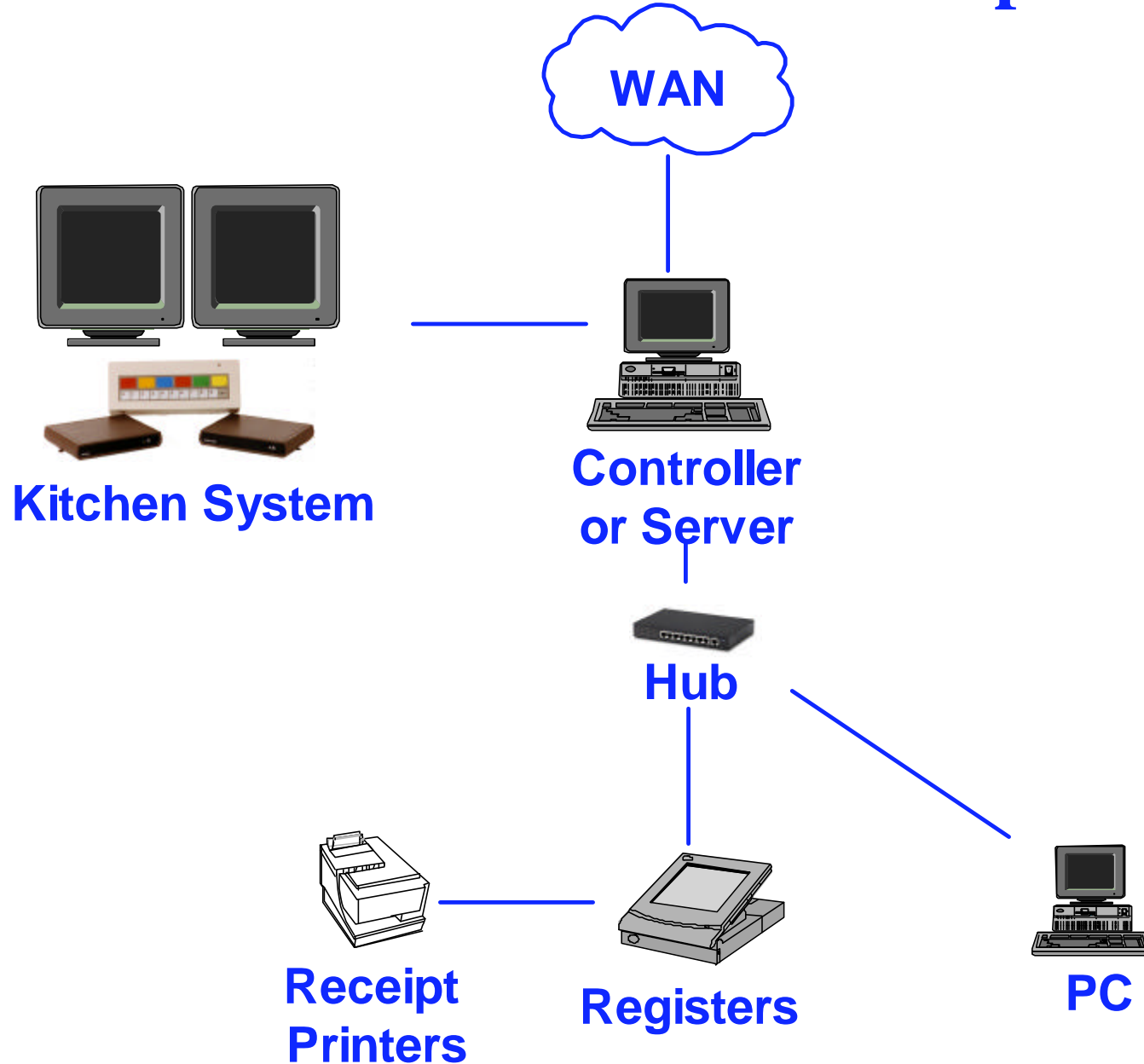
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Fast Food Service Solution Example





Low Cost Food Service Example





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Thank You

