

ECE 671 – Lecture 6

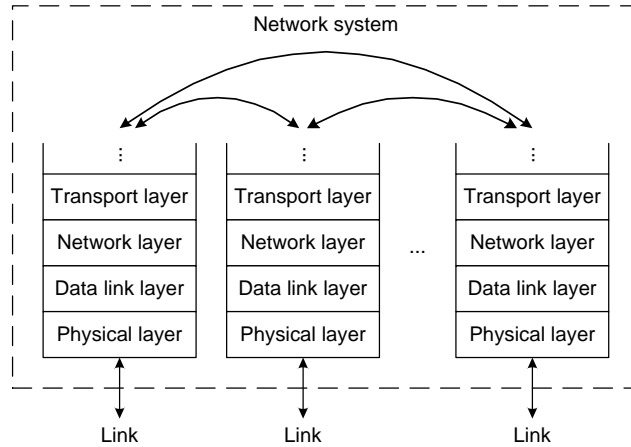
Network Systems and
Throughput Preservation

Network systems

- What does a network system do?

Network systems

- Data is switched between network stacks



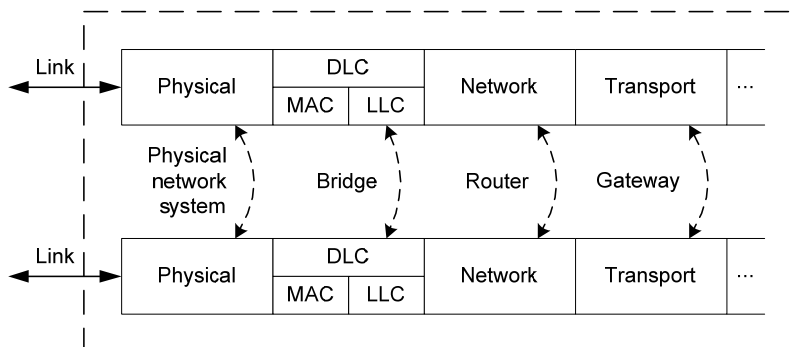
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Classification of network systems

- Network system differ by level of protocol processing



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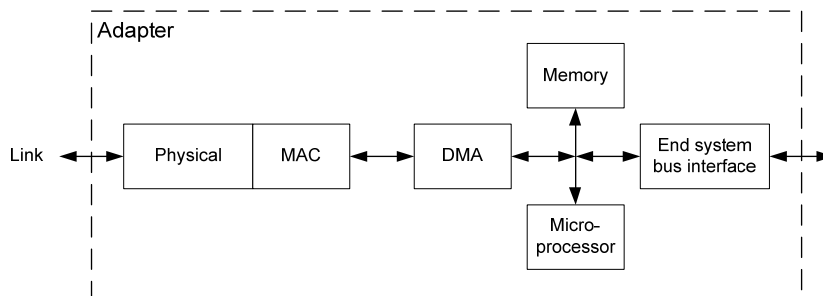
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Design of network systems

- How would you design/implement a network system?

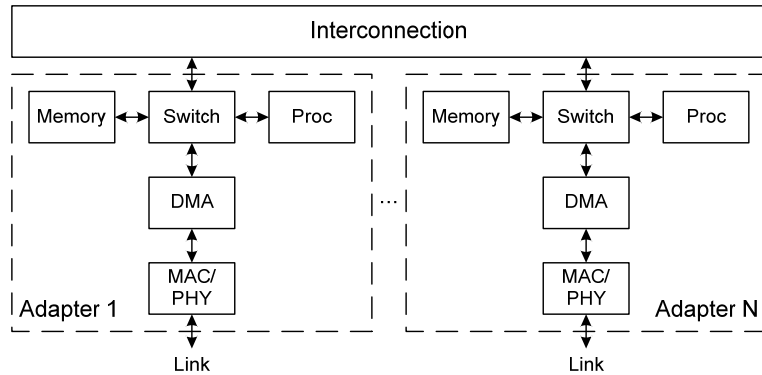
Example network system: NIC

- Network interface card / adapter connects to link
- Block diagram:



Example network system: switch

- Switch connects multiple links
- Block diagram:



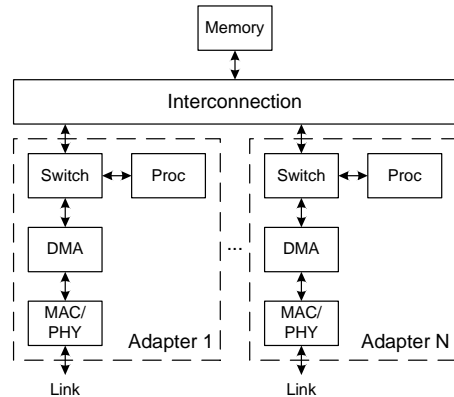
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Example network system: switch

- System may differ by system architecture
- Example: share memory vs. distributed memory



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Requirements for network systems

- What criteria matter for network systems?

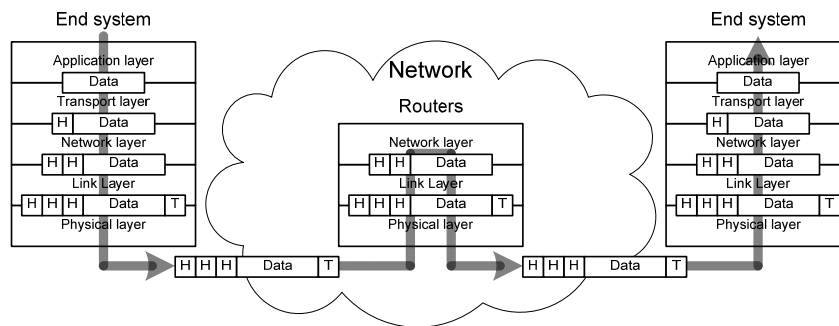
Application requirements

- Different applications have different requirements:

	Throughput	Delay	Jitter	Packet loss
Internet browsing	Low	Large	Insensitive	Unacceptable
Scientific data archiving	High	Medium	Indifferent	Unacceptable
Telephony	Low	Minimal	Sensitive	Low
Internet TV	High	Minimal	Sensitive	Low
First-person shooter game	Low	Minimal	Very sensitive	Unacceptable
Real-time surgery	High	Minimal	Very sensitive	Unacceptable
Delay-tolerant networking	Low	Large	Insensitive	Acceptable

Overhead and bottlenecks

- Where are potential overheads and bottlenecks?



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Throughput preservation

- Throughput performance
 - Ensure network system can handle link rates at all points
- Delay/jitter
 - Ensure network system processes traffic quickly
- Packet loss
 - Ensure sufficient buffer space and fast processing
- Most network system design focus on bandwidth

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Packet rate vs. data rate

- Data rate states total number of bits per second
- Each packet requires specific processing
 - Packet rate sometimes more meaningful
- What is the packet rate for a 10Gbps link?
 - Distinguish small packets and large packets

System design for throughput

- What are the differences between these systems?
 - How do they affect throughput preservation?

