

Circuit Switching vs Packet Switching by Nadine Chen

1. Circuit switching uses dedicated links (only one source at a time per channel)
 - call setup to reserve bandwidth
 - uses full channel capacity during connection time
 - disconnection request when done to release link

Delay = time setup + time propagation + time call + time disconnect
2. Packet switching shares the links (more than one source at the same time on the same channel)
 - message is broken into smaller packets: each packet contains header (control information) and data
 - packets are sent independent of each other and regrouped at the final node
 - no setup and disconnection
 - less waste of bandwidth because packets are transmitted one very closely after another

Delay = time propagation + time packet + time routing
3. Circuit switching in optics - easy to implement
 - once the route is setup, there is no logical processing
 - requires no buffering
4. Packet switching in optics - more complex to implement
 - since each packet is routed separately, logical operation is necessary on the header information to send it through the network correctly
 - buffering is also necessary to store the data portion of the packet while the header is being processed
 - additional buffering is used for resolving contention (contention occurs when more than one input needs to be switched to the same output)
5. Example of Circuit Switched Design - Coloring Adaptive Pathgraph
 - wavelength routing algorithm where input is switched to output based

on the wavelength of the signal
-performance curve shows that when # of requests is low, significant drop
of blocking rate occurs as the # of wavelengths used in the system increases
-but as the # of requests grows, # of wavelengths doesn't seem to reduce
blocking rate by much

6. Photonic Fast Packet Switching - basic characteristics

- packet header is extracted from input and used for state control of photonic switch, the original packet is buffered during this header processing
- synchronization at input of photonic switch

7. Example of Optical Buffering - M-Quadro

- the 2-stage design contains 3 optical switches and 2 sets of fiber delay lines
- each set of delay lines can hold a multiple number of packets
- by varying the capacity of these delay lines, low packet loss can be achieved