# TCP Timers

- Retransmission
- Persistence
- Keepalive
- Time-waited

# Retransmission timer

• For lost or discarded segment, TCP employs a retransmission timer

• Measures waiting time for an ack of a segment

• When TCP sends a segment, time is created for that segment

• If an ack is received for the segment before timer expires, timer is destroyed

• If timer expires before ack arrives, the segment is retransmitted and timer is reset

# Retransmission timer

- Different connections require different retransmission time settings
- If the retransmission time is set too short, acks will not have time to return & segments will be prematurely retransmitted
- If the retransmission time is set too long, sending process will wait unnecessarily for retransmissions to occur
- Retransmission timers should not be fixed even for one connection due to changing traffic levels

# Persistence timer

• Addresses zero (0) window size advertisement

• Sender will stop sending until ack received from destination TCP

• If ack gets lost, destination TCP will wait indefinitely for more data from the sender

• This deadlock situation must be avoided

• After persistence timer elapses, sender sends a probe segment (only 1 byte)

• Probe alerts destination TCP that ack was lost and must be resent

# Keep Alive timer

• Implemented in some TCP servers

• Prevents a long idle connection between two connected TCP implementations

• Timer is typically set at 2 hours

• After timer elapses, 10 "probe" segments are rapidly sent

• If no response after 10 probes, it is assumed that the client is down so connection is terminated

# Time-waited timer

• Used during connection termination

• Keeps connection alive long enough for any remaining FIN segments to arrive (which are then discarded)

• The MSL is the maximum time a segment can exist in the Internet before it is dropped.The common value for MSL is between 30 seconds and 1 minute.

# TCP State transition diagram



**Figure 15.13**   *State transition diagram*