

## Video - TCP Reliability - Data Loss and Retransmission (3 min)

The graphic depicted in this video uses segment numbers in place of sequence numbers. TCP is a reliable protocol. It uses sequence numbers and acknowledgements to provide that reliability. But what happens when data is lost in transit? As a reliable protocol, there has to be a mechanism for resending lost data so that an entire piece of data, like a file, or an image, or a video can be rebuilt from all of the segments. If we look at this animation, we can see this process in action. I'll press play. The source host here sends segment one and starts a timer. You can see the timer's running. The destination host receives segment one and since it's received segment one, it's gonna send an acknowledgement. Let's see what happens. We can see that the destination host has received segment one, acknowledges the delivery, and is going to send an ack two, an acknowledgement two, requesting number two. Why? It received one, so it sends a request for two, and an ack two. So we'll see that get sent. Alright, there goes the acknowledgement. The source receives the acknowledgement before the timer expires, and now can send segment two. There's segment two. It's sent, and as you can see, the timer has started. It's going to wait to get an acknowledgment. If it doesn't receive an acknowledgement from the destination before the timer expires, it will resend segment two. Let's see this in action. You can see the destination has not received segment two. Since it hasn't received segment two, it won't send an acknowledgement number three back to the device. It's not going to acknowledge that it received two and send an ack three back to the source host. Let's see what happens. No acknowledgement, the timer expires. You can see here, the timer expires, so what will the source host do? The source host will retransmit, or resend, segment two and restart the timer. This time, the information was received by the destination and now it's going to send an ack three, or acknowledgement three, requesting the next piece of data, which in this case, would be number three. The acknowledgement's received before the timer expires and segment three is sent. Segment three is received, acknowledged, and a request for four is sent in an acknowledgement. The acknowledgement is received before the timer expires and now the device can send segment four, or in this case, it's the end of the transmission. The ability of TCP, to retransmit missing segments, makes applications that use the TCP protocol very reliable.