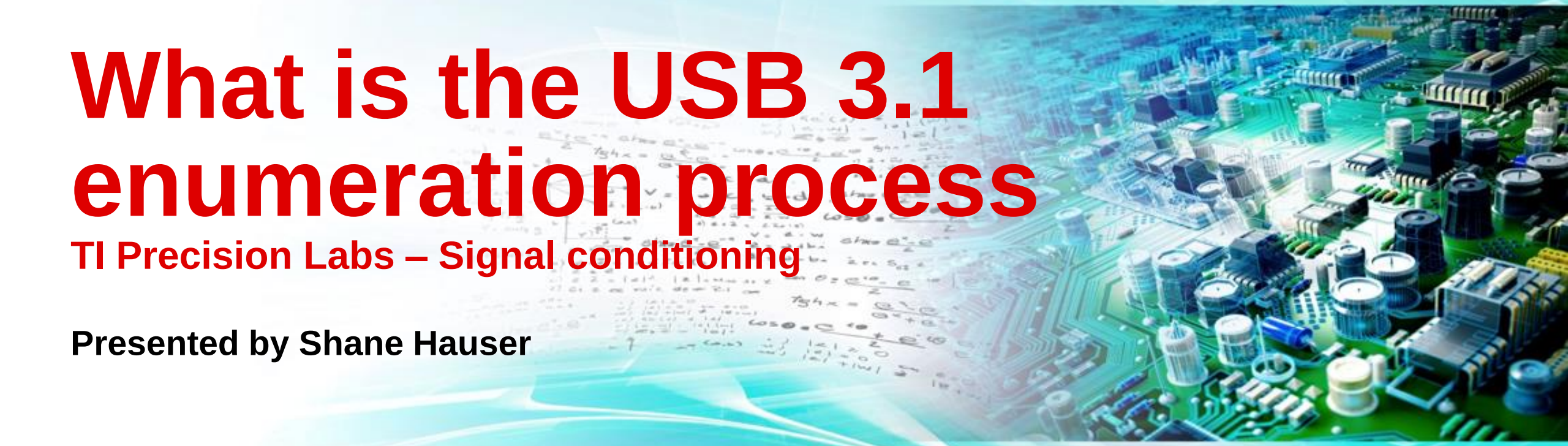
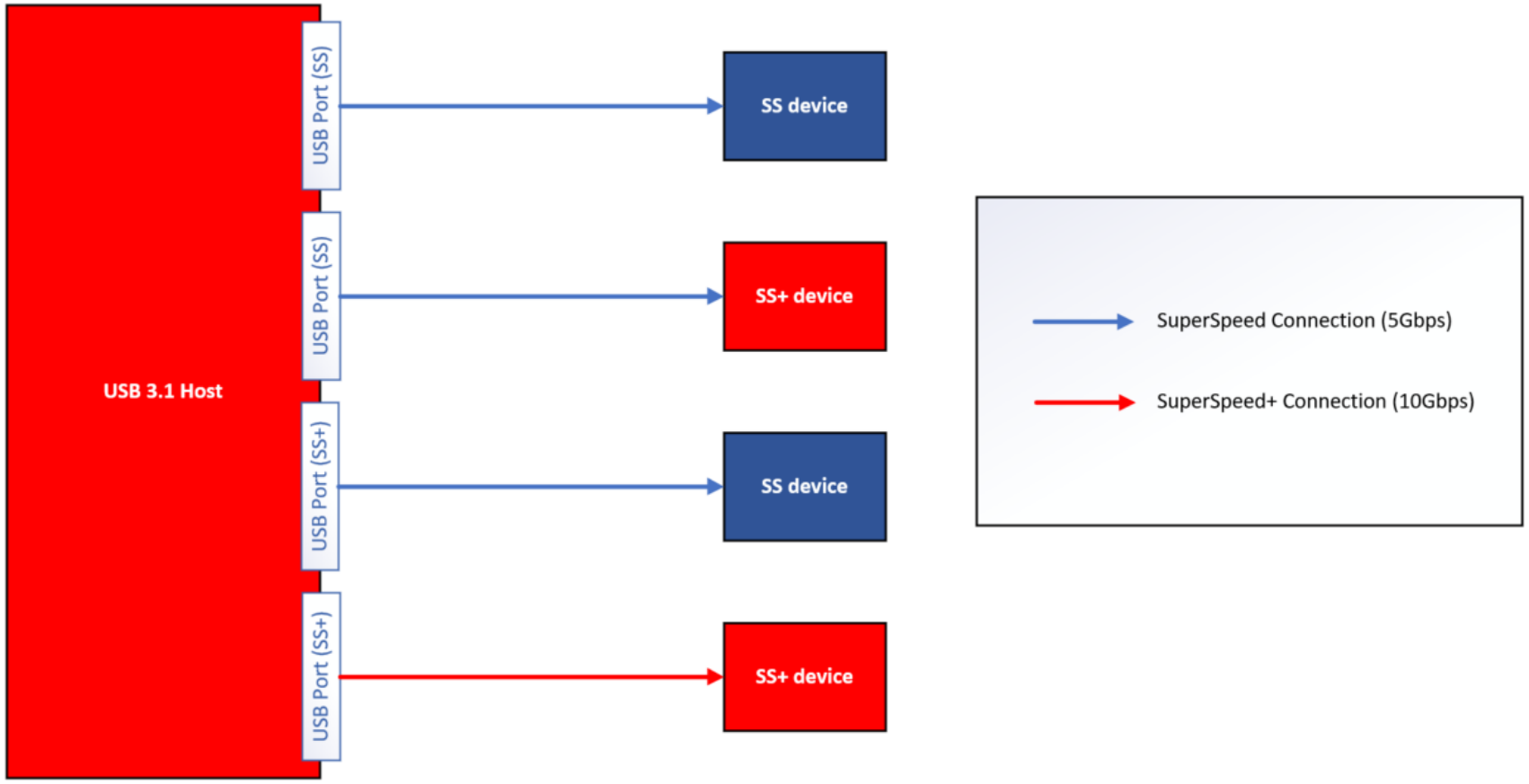
What is the USB 3.1 enumeration process

TI Precision Labs – Signal conditioning



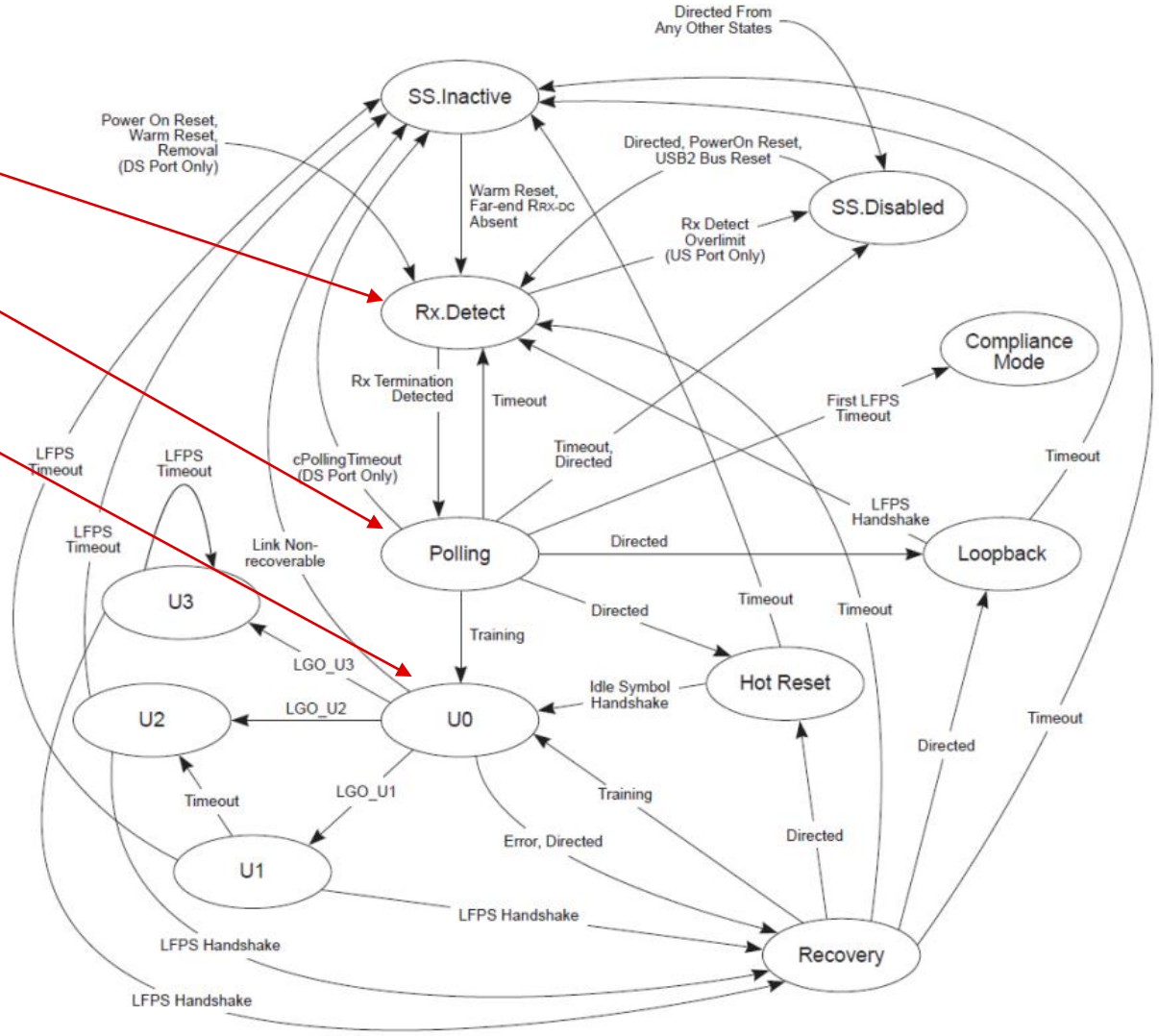
Presented by Shane Hauser

USB 3.1 ecosystem



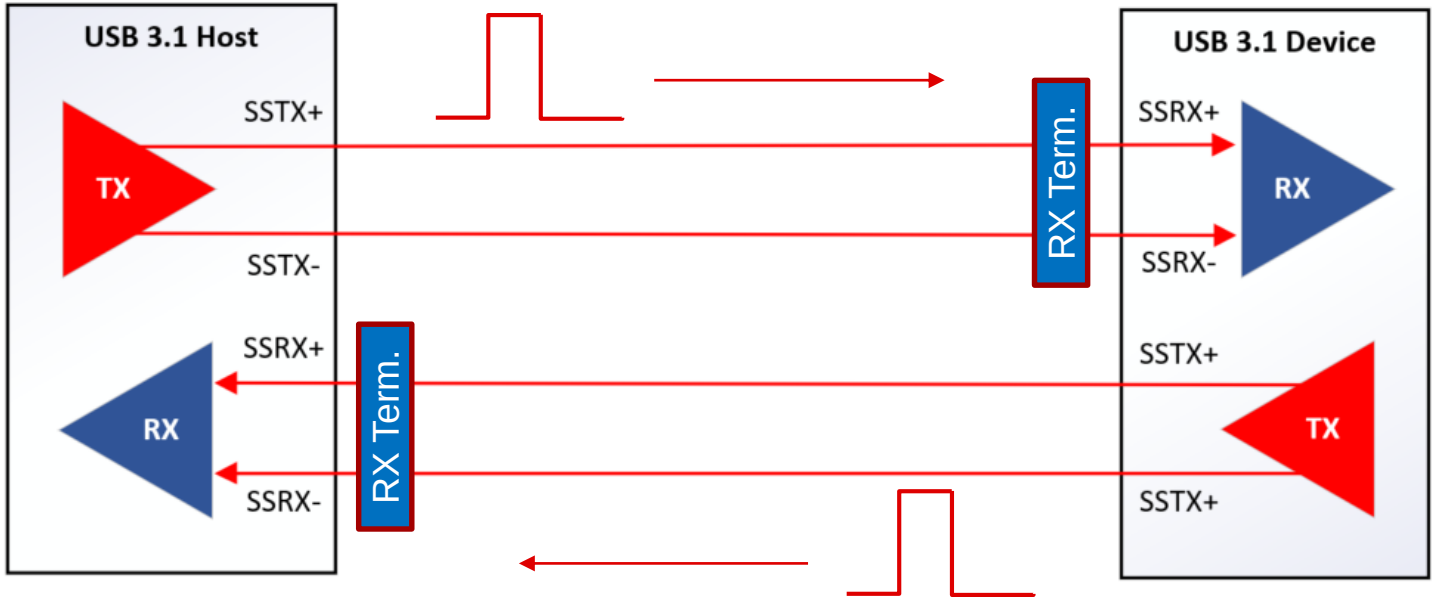
USB 3.1 enumeration overview

- RX detect
- Polling (LFPS)
- Training
- U0 (Active Mode)



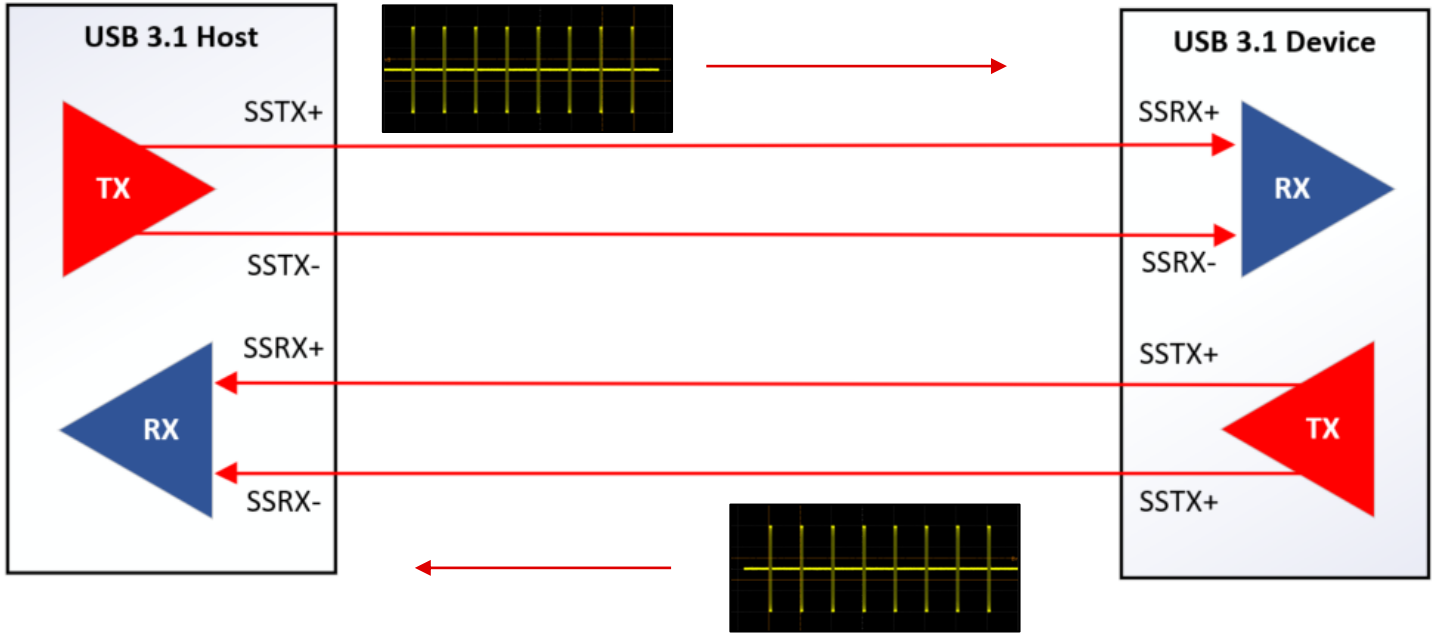
RX detect

1. Both host and device transmitters send RX detect pulses to look for a connection.
2. 90-ohm differential terminations on the receivers alter the pulse.
3. The altered pulse is recognized by the transmitter to show that a host/device is present.



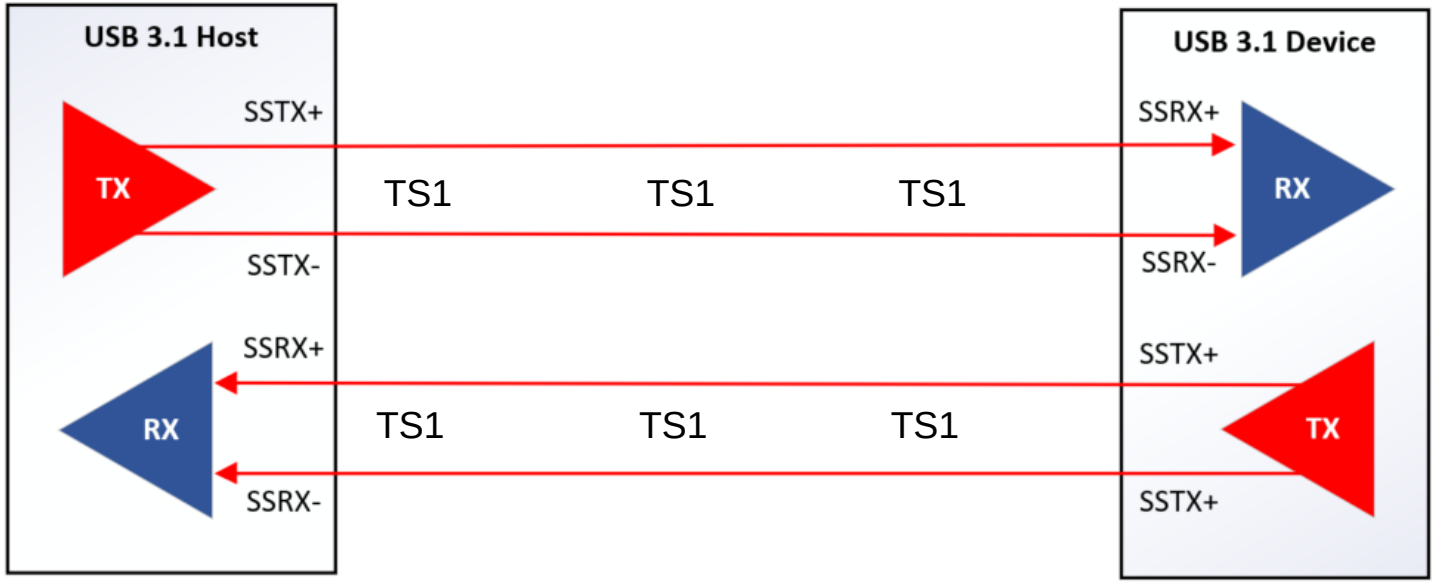
Polling

1. The host and device recognize a connection and begin the LFPS handshake.
2. LFPS pulses are sent to communicate which connection speed can be established.
   - A 10Gbps host/device will send special signals SCD1 and SCD2 in the LFPS pulses
   - If these signals are not received back, the 10Gbps host/device will fall back to 5G speed

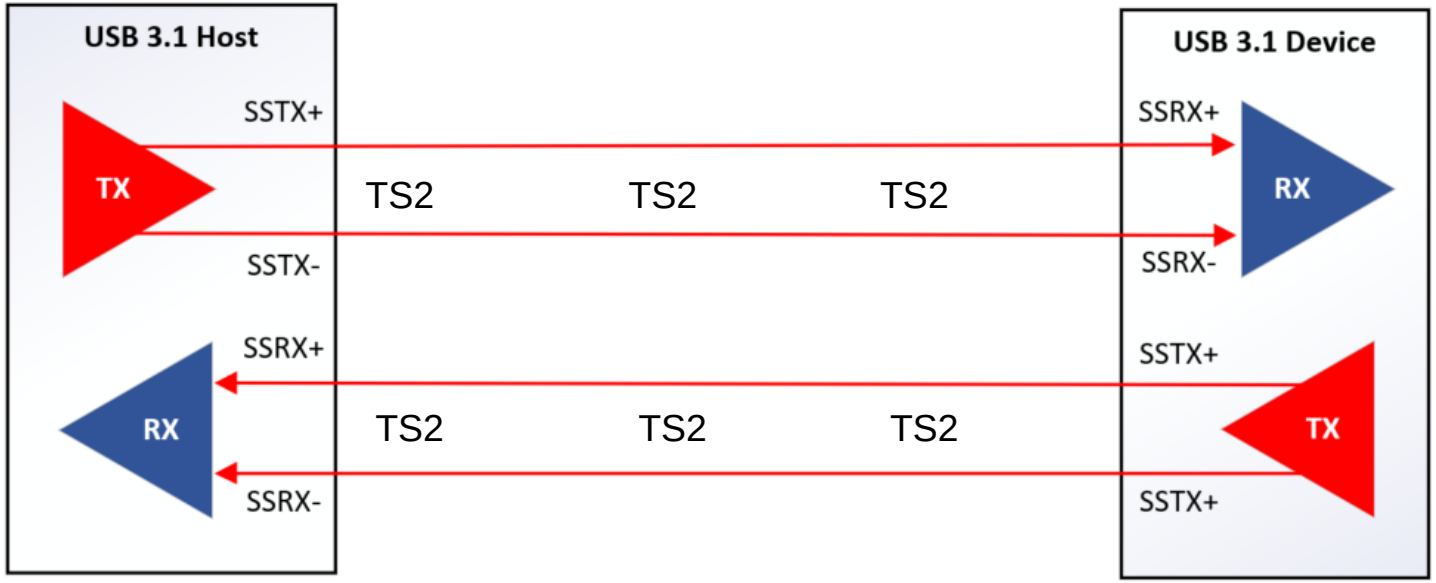


Training

Training

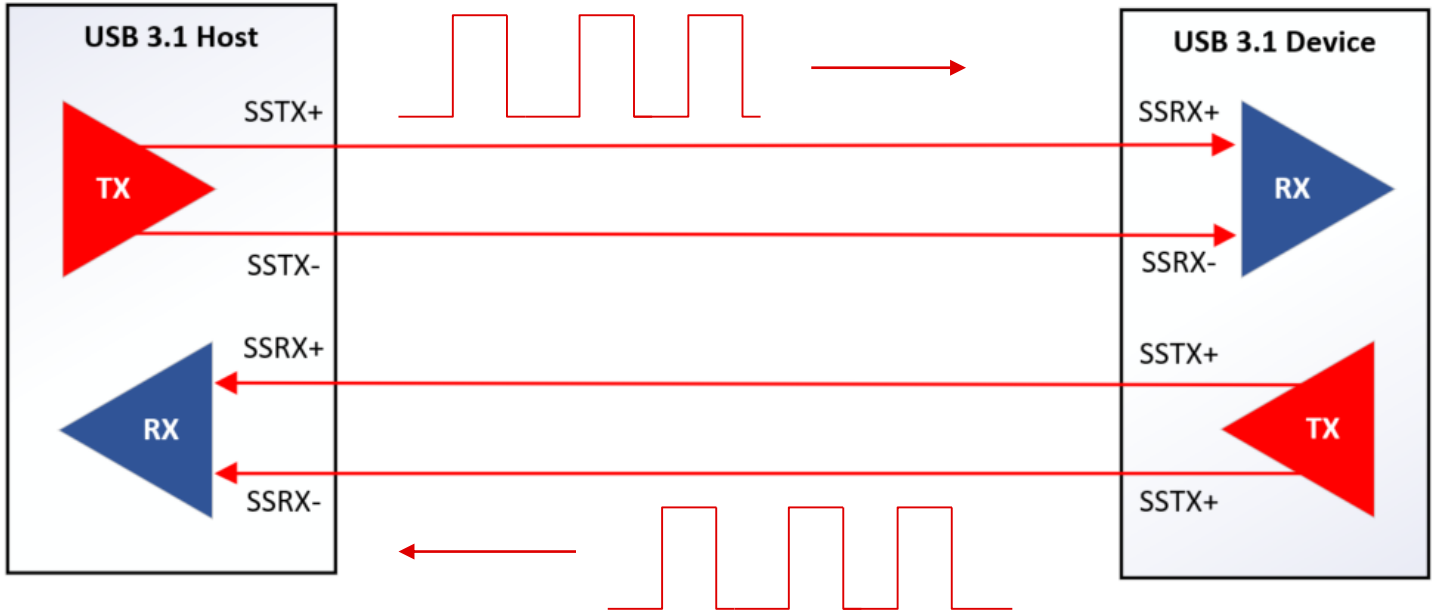


Training



U0 (active state)

1. The host and device have finished enumerating and begin transferring data.
2. Data can include files, video and more depending on the connected USB device.
3. When disconnected the USB host and device will return to the RX detect state.



Summary

1. RX detect shows a host and device are physically connected
2. Polling negotiates the connection speed at 5Gbps (SuperSpeed) or 10Gbps (SuperSpeed+)
3. Training verifies that the connection is stable
4. U0 completes the process and allows data transfer between the host and device.

Short quiz (true or false)

- RX detect is the second step in USB3.1 enumeration

  FALSE

- Eight pairs of TS1 and eight pairs of TS2 must be detected to complete the training stage

  TRUE

- SuperSpeed+ is another term for a 10Gbps USB3.1 connection

  TRUE

- A 10Gbps USB host and a 5Gbps USB device can establish a 10Gbps USB connection

  FALSE

To find more technical resources and search for USB3.1 products, visit **ti.com/interface/overview.html**