Overlay Routing

This is similar to what Real Network and Gnutella do.

Reliable Multicast Transport

Hosts need to tell the sender to retransmit lost packets.
How should the hosts inform the sender to retransmit packets?
- Ack every received packet _ floods sender for sure
- Nack all missing packets _ potentially floods the sender
- Merge nacks from children going back to the sender _ sender only needs to save state per group
- Heterogeneous bandwidths _ persistent loses

Layered Multicast

Different layers have different quality/compressions (fast video, choppy video, audio) to allow heterogeneous bandwidths to access the stream.

Tornado codes help with forward error correction. You only need to receive n of m (where n < m) packets to read the data.

**Scalable Reliable Multicast** (multicast nacks so anyone can retransmit lost packets, not just the sender)
- Randomized timers to send nack (based on distance to sender)
- If you hear a nack and you were going to send one, turn off your timer
- Randomized timers to reply from hosts that properly received the packets in question
- If you hear a reply and you were going to reply, turn off your timer

You could use hop-by-hop retransmission of packets to relieve the sender of the burden of retransmission.

You can combine push/pull by multicasting data to caches that hosts pull from throughout the network.

Dynamic auto-config of layered multicast means you sign up for the slowest layer and keep moving up to faster layers until you find a layer that fails.