Switch vs Router Forwarding

Switch Frame Forwarding (Ver 1.0 – store-and-forward, with VLANs)

Here's a very basic version of frame forwarding by a (managed) switch; it doesn't consider ACLs, QoS, or overload conditions.

1. Receive entire frame [input buffer]

2. Re-compute CRC

3. Discard frame if bad CRC; otherwise continue processing

4. Determine VLAN:
   – for access ports, according to configured VLAN
   – for trunk ports, according to VLAN tag on frame (or Native VLAN if no tag)

5. Look in MAC address table, according to VLAN, for possible match
   – if match, then select single egress port/trunk
   – if no match, then select flooding as egress method

6. Determine whether to add or strip VLAN tag:
   – Add a tag if passing from access to trunk (new tag = access VLAN #)
   – Strip the tag if passing from trunk to access
   – No change if not crossing access / trunk boundary

7. If VLAN tag added or stripped, compute **new CRC**

8. Queue the frame on selected egress port(s) [output buffer(s)]

Router Frame Forwarding (Ver 1.0)

Again, a basic version of frame handling/packet forwarding by a router;
it doesn't consider ACLs, queuing, QoS, or other conditions.

1. Check CRC (if bad, drop, done); check dest MAC addr (if not me, drop, done)
   strip L2 framing

2. Check for VLAN tags and strip them (there may possibly be some processing)
   L3 Packet modified / re-written

3. Check IP header fields: verify checksum and if okay then check destination IP
   if dest IP is me, punt up to Control Plane, done; else continue forwarding!

4. Decrement TTL count by 1; if now 0, punt up to Control Plane for ICMP msg
   L3 Packet modified / re-written

5. Recalculate Checksum in IP header
   L3 Packet modified / re-written

6. Check routing table for *best* longest(!) match to destination IP

7. Determine encap required for egress interface: dst MAC, src MAC, (VLAN ?)
   L2 frame modified / re-written

8. Compute **new CRC** and add to egress frame
   L2 frame modified / re-written