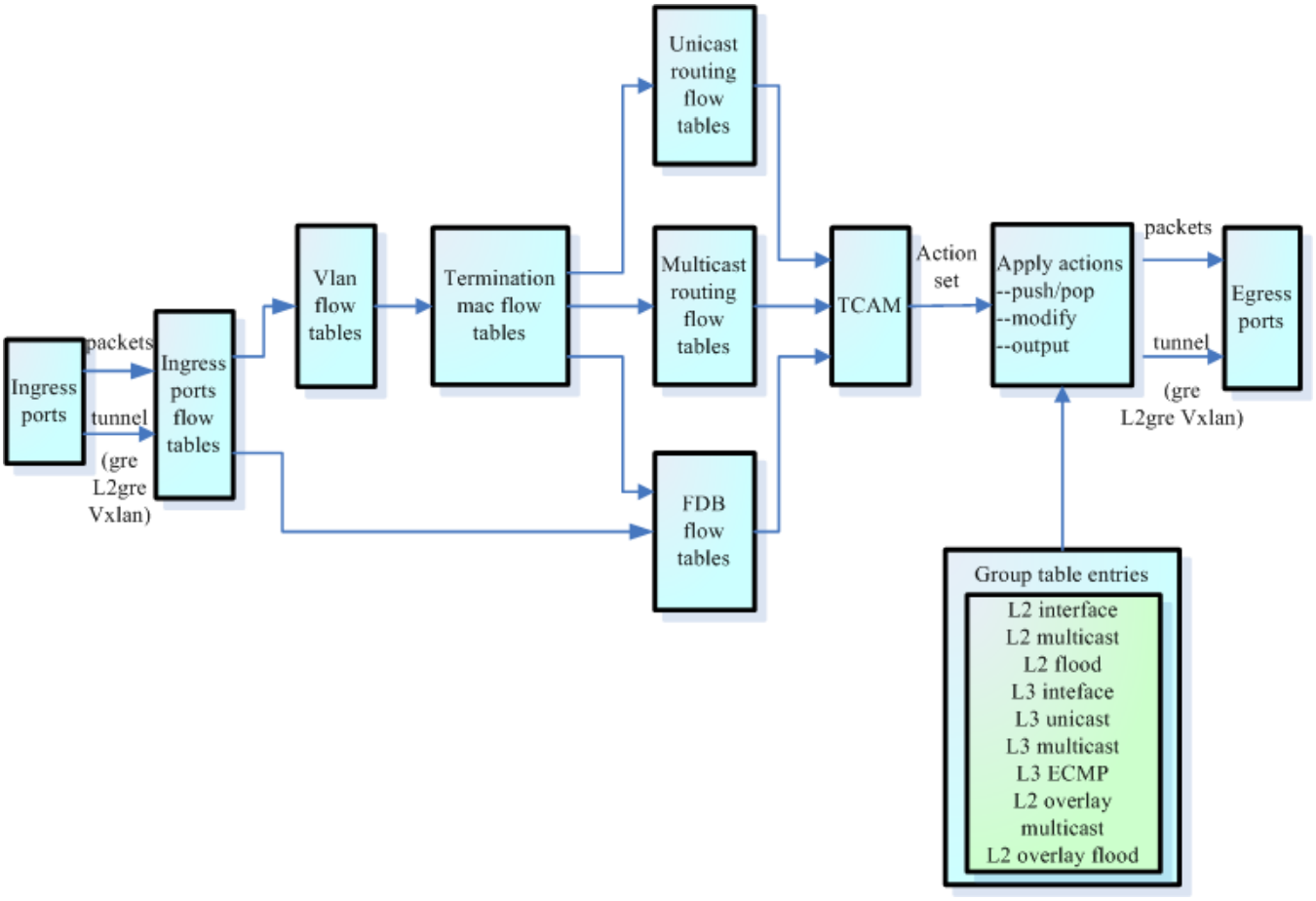
Switch Hardware Architecture

Most Top of Rack switches have the same general architecture. Once packets enter into a switch, they go through an ASIC "Pipeline" designed to make decisions on packets.

As an example, here is the simplified pipeline of a Broadcom chipset.



Here are definitions of the most common terminology to describe those architectures:

FIB - Forwarding Information Base or RoutingTable

FIB is a table memory used mainly to make IP destination prefix-based switching decisions.

The FIB is conceptually similar to a routing table or information base. It maintains a mirror image of the forwarding information contained in the IP routing table. When routing or topology changes occur in the network, the IP routing table is updated, and those changes are reflected in the FIB. The FIB maintains next-hop address information based on the information in the IP routing table.

TCAM - Ternary Content-addressable Memory

Ternary content-addressable memory (TCAM) is a memory type used mainly for QOS or ACL.
A TCAM is a specialized type of high-speed memory that searches all of its contents in a single clock cycle. The term “ternary” refers to its ability to store and query data using three different inputs: 0, 1 and X.

In addition, most modern ASIC switch architecture supports the ability to perform multiple lookups into multiple distinct TCAM regions (or slices) in parallel. As a result of this ability to perform multiple lookups simultaneously, modern switches do not suffer any performance degradation by enabling additional hardware-switching features, such as QoS and IP ACL processing.