Real Routing at Gigabit Speeds

Dr. Hemant Kanakia, Founder & CEO
kanakia@torrentnet.com
Myths about routing

- Routing is slow
- Routing is expensive
- Need ATM for QOS
- Routers are difficult to maintain/install
Router technology did lag

- processor
- memory size
- bandwidth
- router capacity

1990 1995
Typical router architecture

- Route Processor
- Switch Fabric
- e.g. Bus, Shared Memory, Crossbar, Distributed Shared Memories

Elements of a router architecture:
- Forwarding Engines
- Slow path
- Fast path
- Route Processor
- Switch Fabric
- e.g. Bus, Shared Memory, Crossbar, Distributed Shared Memories
Typical forwarding engines

A fast micro-processor or ASIC based engines

- hashing algorithm
  - works well only for a small table
- caching of host addresses NOT prefixes
- performance depends on topology and traffic characteristics
Torrent’s forwarding engine

- **100% h/w routing - no hashing/caching**
  - slow path not required

- **200,000+ routes**

- **64,000 multicast groups**

- **100,000+ flow-specs**
  - (dest_add, src_add, dest_port, src_port, prot)
  - matching done by hardware

- **Wire-speed routing for 100 to 1000 MBPS line rates**
ASIK - A new route search algorithm

ASIK search algorithm

- Longest Prefix Match
- Worst-case in finite time like for PT
- Very good average case behavior
- Easy to maintain Routing Table
- Handles a large number of routes
- Easy to implement
A real router should have…

Complete suite of routing protocols: RIP, OSPF, DVMRP, PIM, BGP, SNMP, DHCP relay agent, authentication protocols
Be careful of claims about switch capacity

- Bus-based systems
- Crossbar architecture
  - Scheduling algorithms
    - unicast, multicast, priorities?
- Shared memory architecture
- Interconnection of shared memory elements
  - per-flow queuing and scheduling
End-to-end QOS with Torrent’s router

- Classifies packets using whole IP header
- Over 100,000 header match filters available per port
- Filters managed with CLI, Global Policy Manager, or RSVP
- Per-flow queues and Round-robin servicing of active flows
- Policing - credit-based control over traffic
Router management

- Standard toolkit includes: GUIs, Command Line Interfaces, Web-based, Java applets…etc.
- Higher level abstractions needed to really simplify management of routers
  - Active Directory (Microsoft, Cisco, Torrent)
  - Global Policy Managers (Intel, Torrent)
What’s the message?

- Route Always
- Gigabit routing at affordable prices in enterprises and ISP
- Sleep better with the familiar paradigm (but faster, affordable and prettier)
- Just say no to _____ switching