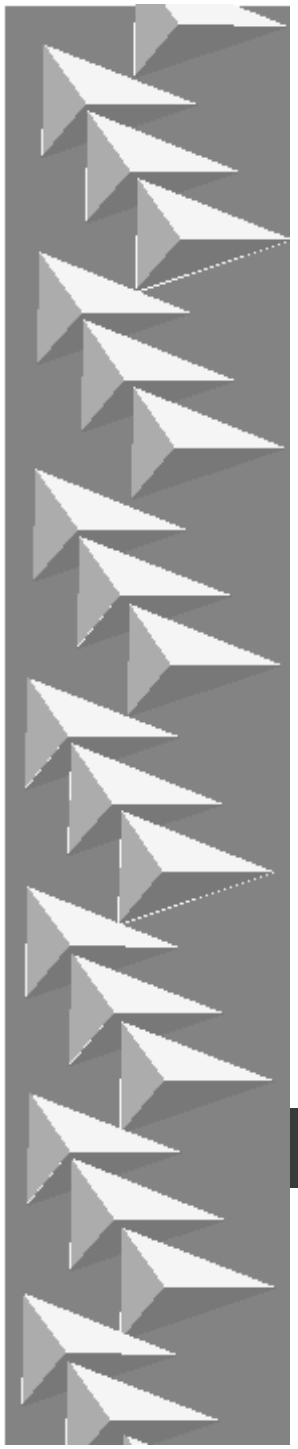

Real Routing at Gigabit Speeds

Dr. Hemant Kanakia, Founder & CEO

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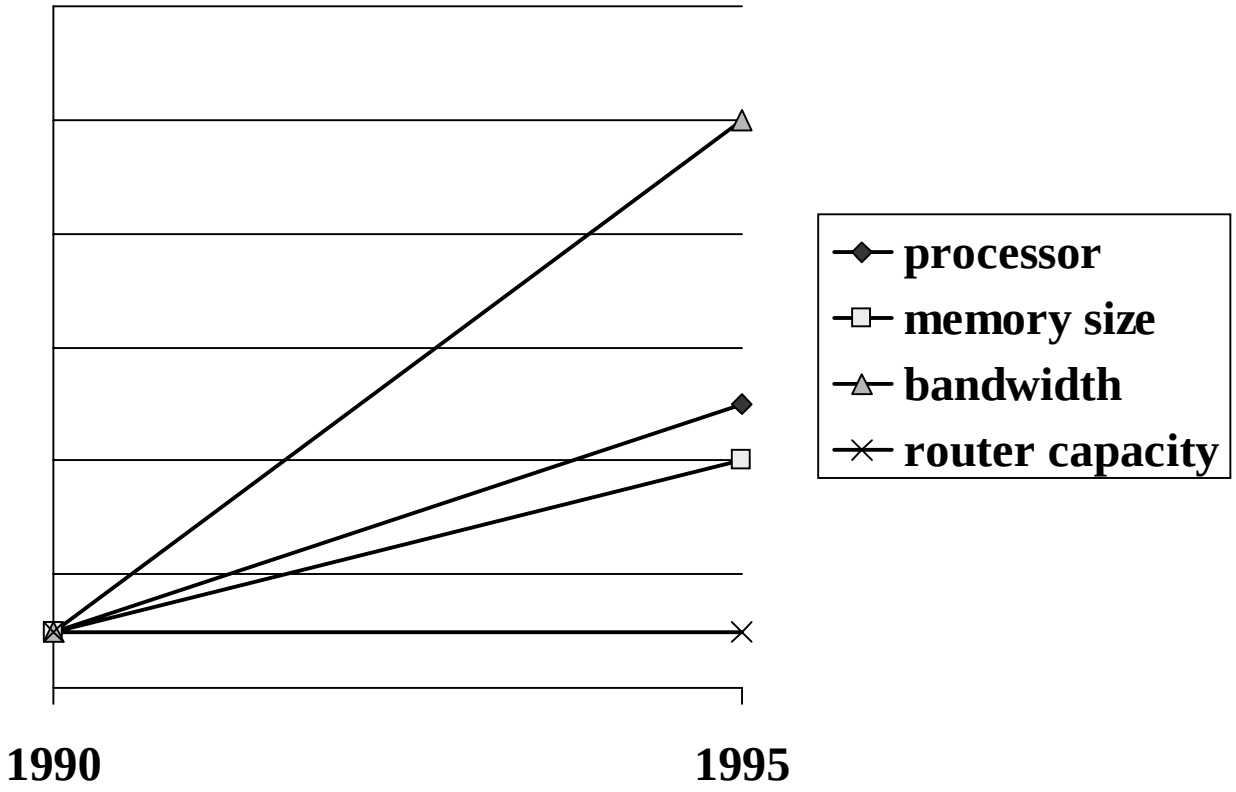
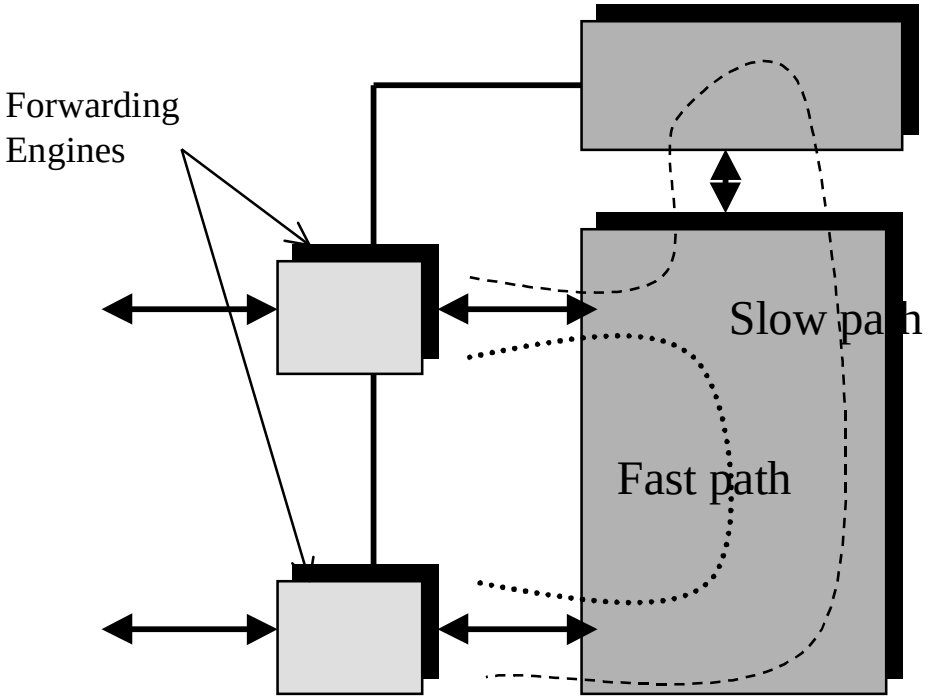
Myths about routing

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

Router technology did lag



Typical router architecture



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**