

Requirements

Switching Performance increase demand
Multi-functional and multi-service routers

Router technologies of today

Linux-based routers:

- +Availability on a wide variety of platforms;
- +Developed in an open and distributed way;
- +Meets the current requirements of modern operating systems;
- +Extensive and grooming set of networking features;
- Functionalities bounded by CPU performance
- Forwarding performance difficult to predict: PC (shared) busses interrupt overhead

Commercial routers and network processors:

- Rely on the roadmap of a manufacturer and/or
- Add extra adaptation boxes;
- Customized, cost of acquisition and training.

IFT-based Experimental Router

IFT (Hardware processes)

- Address lookup
- Classification
- Monitoring
- Header update

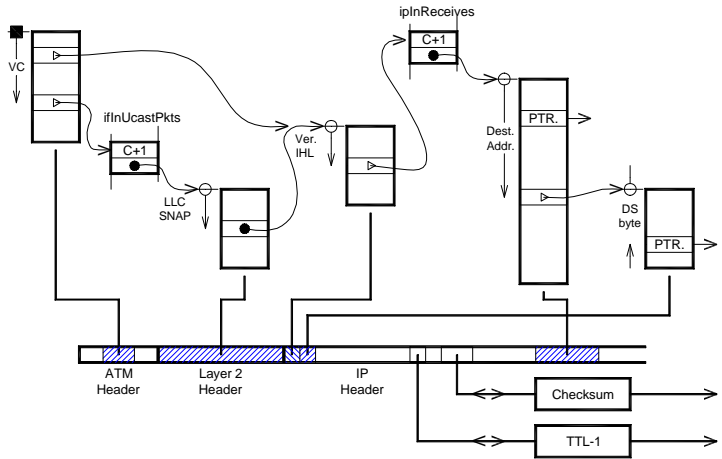
Switch

- Internal communications
- Rate adaptation
- Queuing

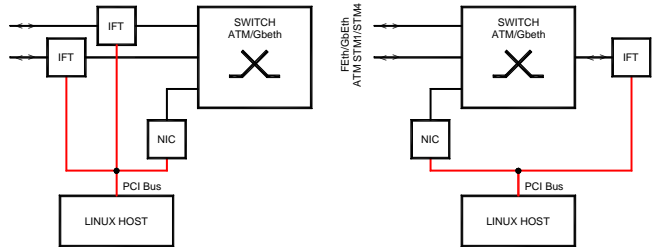
Linux Host

- Kernel Data Plane functionality (1% of incoming datagrams)
- Control plane processes
 - Routing
 - Management, Configuration
- IFT software driver
- IFT configuration through Netlink Socket messages processing

Header processing for basic IPv4 forwarding



Server and distributed models



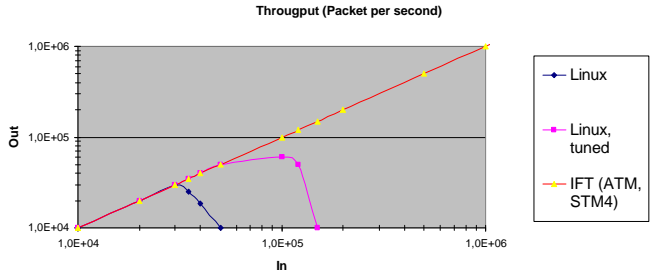
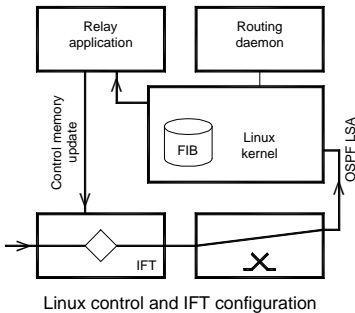
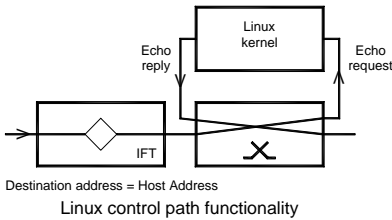
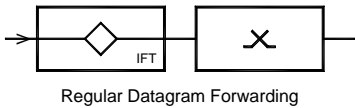
Performances

Lookup

- Worst case lookup time $O(W)$
- Worst case update time $O(W/K + 2K)$
- Worst case memory size $O(2^N \cdot NW/K)$

Classification

- Worst case lookup time $O(dW)$
- Worst case memory size $O(N^d)$



Ongoing developments

- Diffserv/MPLS Routing
- Filtering
- Monitoring
- Admission Control

Benefits

- Performances, Scalability
- Control and Data plane separation
- Linux developments base

