Click Modular Router

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Click - Architecture

- A flexible modular architecture for creating routers
- Similar to the flow graph model of GNU Radio

- Basic Processing block – *Elements*
- Elements connected together to form the path of packet transfer
Click - Architecture

A sample element. Triangular ports are inputs and rectangular ports are outputs.

A router configuration that throws away all packets.

Source: Click Modular Router – E. Kohler et al. – ACM Transactions
Click - Architecture

- Elements have *Ports* – input and output ports

- 3 types of ports:
  - Push
  - Pull
  - Agnostic

Push and Pull requests do not block.
Click - Architecture

Source: Click Modular Router – E. Kohler et al. – ACM Transactions
Click - Architecture

- **Queues** – Explicit Storage Elements
- 1 push input port and 1 pull output port
- *Packet Scheduler* – A pull element with multiple inputs and one output
- Scheduling elements make local decisions

Source: Click Modular Router – E. Kohler PhD Thesis
Click – CPU Scheduling

- Uses a *task queue* – consists of elements
- Router thread runs a loop – processing task queue element by element
- Elements that frequently initiate push-pull requests placed on task queue (eg: FromDevice)
- Most elements are implicitly scheduled – push – pull requests
2 drivers: *user-level* and *kernel*

User-level driver can receive packets from the network

But cannot avoid the OS network stack

Kernel driver can replace network stack
Click and GNU Radio

- Could use the click architecture for MAC and interface with USRP