**Optimal Scheduling Policies for Broadcast Information Delivery Systems**

Majid Raissi-Dehkordi / John S. Baras

**Broadcast Delivery** is an efficient way of delivering popular Information (news, weather, stocks, traffic, WWW cache, ...) to a large number of users.

**PULL broadcast delivery:**
- The scheduler receives all the requests for the packages and schedules the broadcast based on that information.
- Heuristic policies have been proposed but the optimal policy is not characterized (Su, Franklin, ...).

**Problem Setup:**
- N stored packages with lengths $L_1, ..., L_N$.
- $K(\leq N)$ broadcast channels.
- Request arrival process for each package is Poisson with rate $\lambda_1, ..., \lambda_N$.

**Goal:**
- Finding the optimal policy for scheduling the broadcast of packages to get the minimum weighted average delay over all users.
- Can serve as benchmark for evaluating other heuristic policies.

**Our approach:**
- A system of $N$ competing queues with bulk service.
- Problem is formulated as a Markov Decision Process.
- We have found an index policy using the dynamic optimization approach.
- **Policy:** Broadcast the packages with $K$ largest indices.
- **Index function:**

**Results:**
- Our policy (NOP)
- Maximum Request First (MRF)
- First Come First Serve (FCFS)
- Priority Index Policy (PIP)
- Average delay results: