Performance Analysis of Multimedia Traffic in Wireless Links

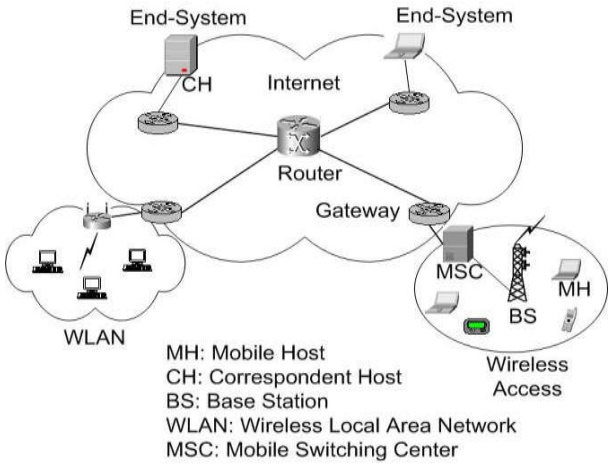
QoS Indexes

- Delay outage rate

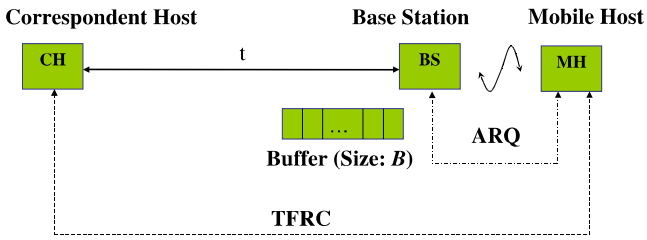
  A natural service guarantee for a voice or video flow is the flow's loss probability for a given packet delay bound

  Prob[packet delay > x] < δ
- Packet loss rate
- Flow throughput

Introduction

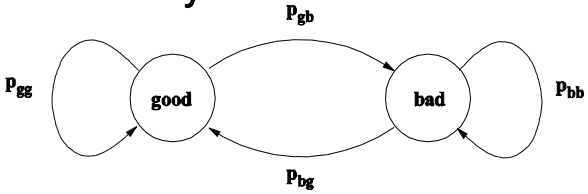


System Model (cont'd)



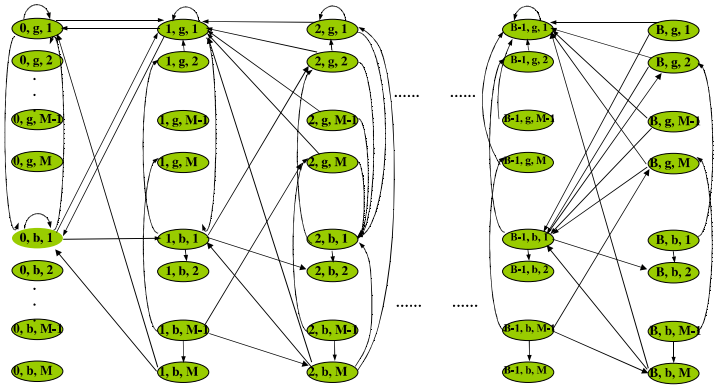
- ARQ: instant feedback, maximum *M* (re)transmissions
- Constant delay, *t*, between CH to BS, no packet loss
- Packet loss: buffer overflow, failed to be transmitted with *M* attempts
- Packet arrival to BS: Bernoulli process

System Model



- Wireless channel: Discrete time two-state Markov model [Zorzi97], packet transmission time *T*
  - Good state: *SNR* > E[*SNR*]/*F, (F* is fading margin)
  - Bad state: *SNR* < E[*SNR*]/*F*
  - Packet error rate: *1-exp(-1/F)*
  - State transition prob.: function of *F*, *T, and* Doppler frequency

Discrete Time Markov Chain



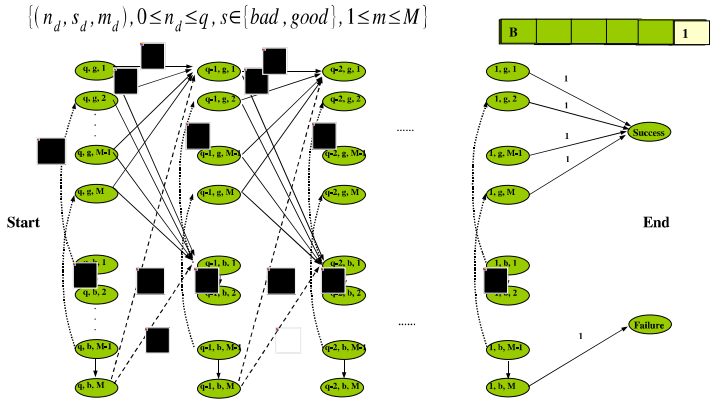
(queue length, channel state, transimission times of served packet)

Packet loss rate

- P **s** = **s**
- Obtain steady state distribution
- Packet loss rate: summation of steady state distribution of bottom row (discarded due to M failed transmissions), and that of last column (discarded due to buffer overflow)

Delay Analysis

- Packet-associated Discrete Time Markov Chain



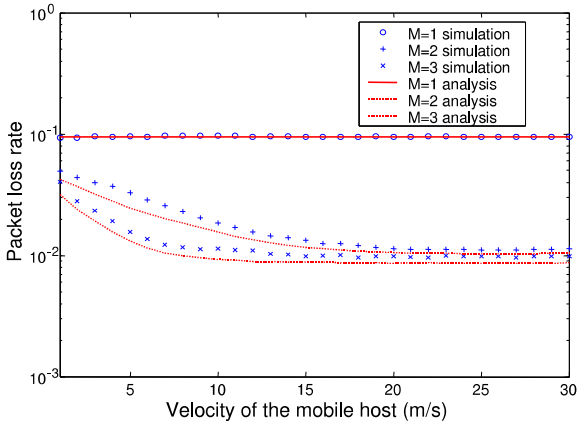
Simulation Results

- Network Simulator: ns-2
- Parameters

Bandwidth of wired link	100Mbps
Bandwidth of wireless link C	384kbps
Carrier frequency	900MHz
Fading margin F	10dB
Buffer size of the base station B	2400bytes
Packet size L	240bytes
End-to-end propagation delay t	20ms
Velocity of the mobile host v	1m/s – 30m/s
Tolerable delay jitter D	50ms

Simulation Results (cont'd)

- Packet loss rate



Simulation Results (cont'd)

- Delay outage rate