Video Multicast over WLAN

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Challenges for video streaming over WLANs:

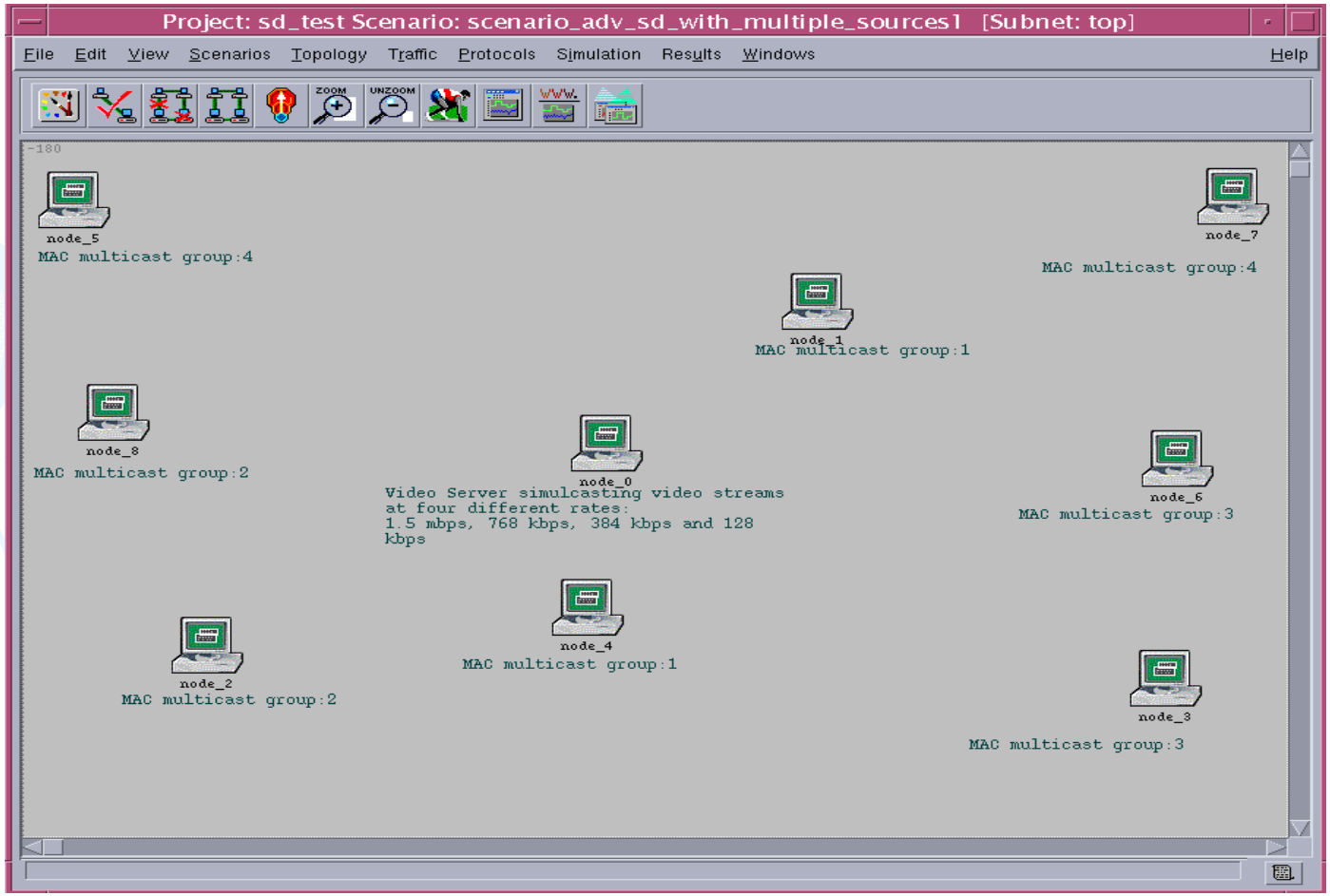
Wireless video transmission is a challenging task because of the following factors:

- limited bandwidth
- high bit errors compared to wired links
- time-varying error–prone environment
- receiver heterogeneity

Problem statement

- How MAC multicast and error control techniques can improve service quality and/or capacity.

OPNET Simulation Model



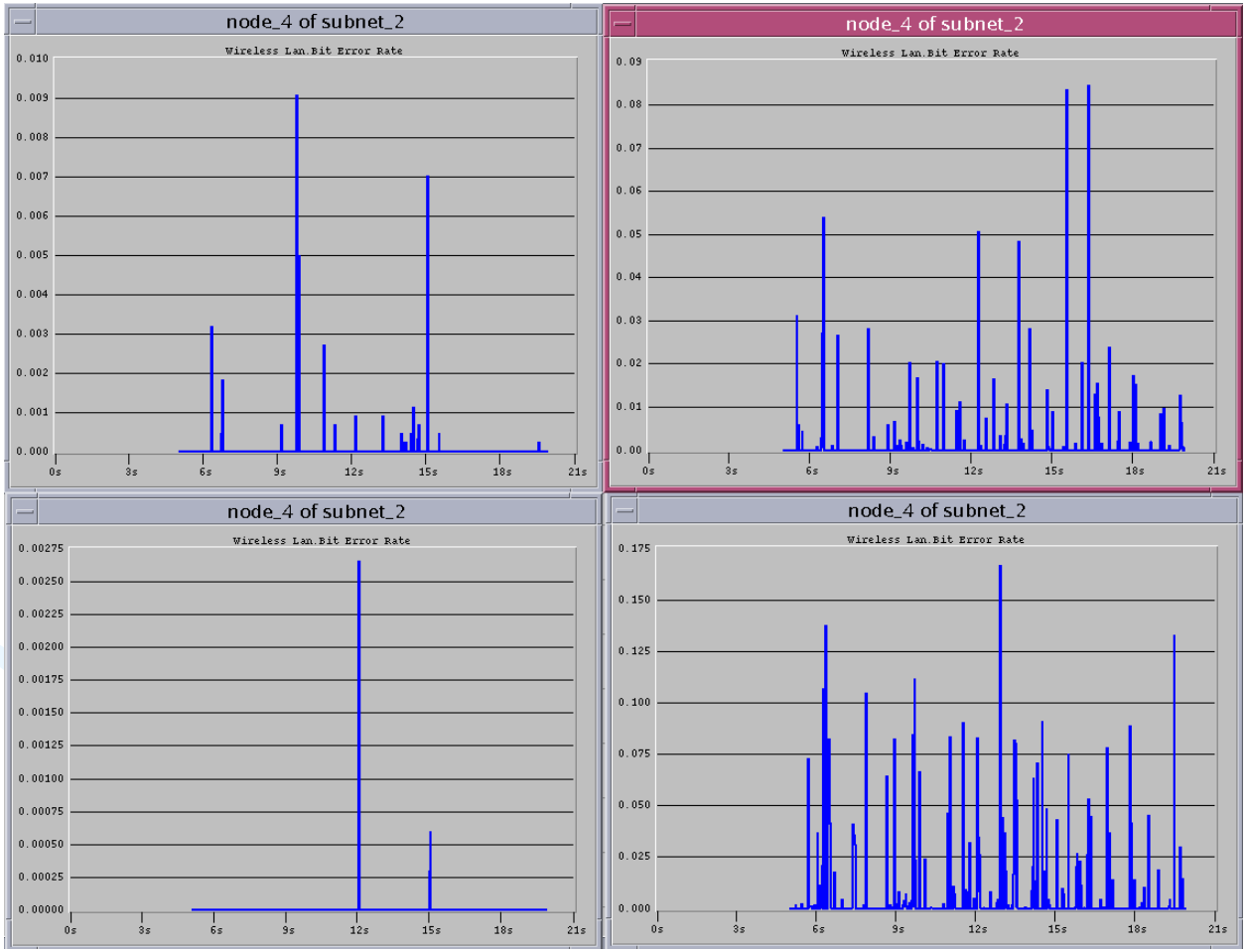
System Model

- Multi-resolution streams of video are available from the server (co-located with AP). The bit rates are 1.5 Mbps, 768 kbps, 384 kbps and 128 kbps.
- Clients subscribe to multicast groups based on the following measurements
  - PHY bit rate
  - Short-term BER
  - Long-term BER

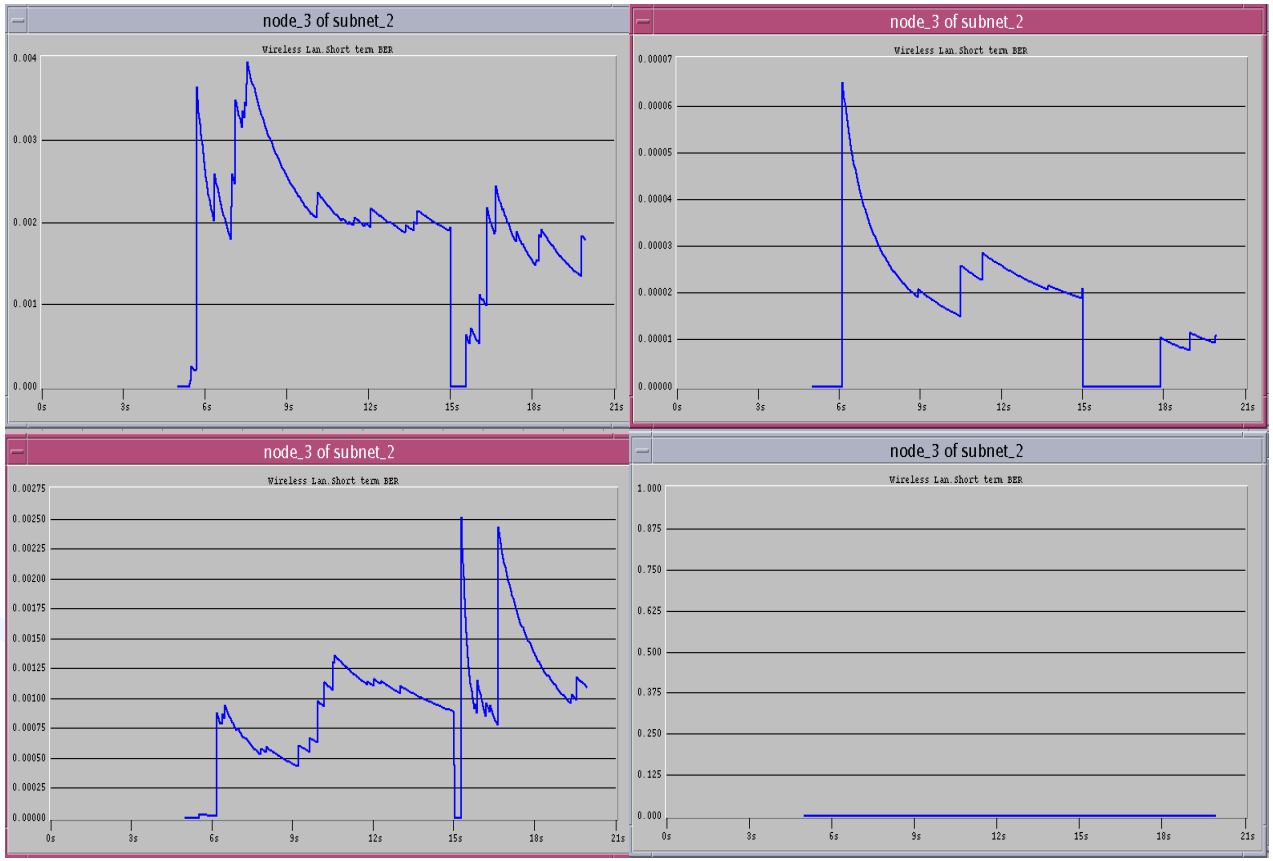
Multicast groups and video bit rates

Video bit rate	Multicast group
1.5 Mbps	1
768 kbps	2
384 kbps	3
128 kbps	4

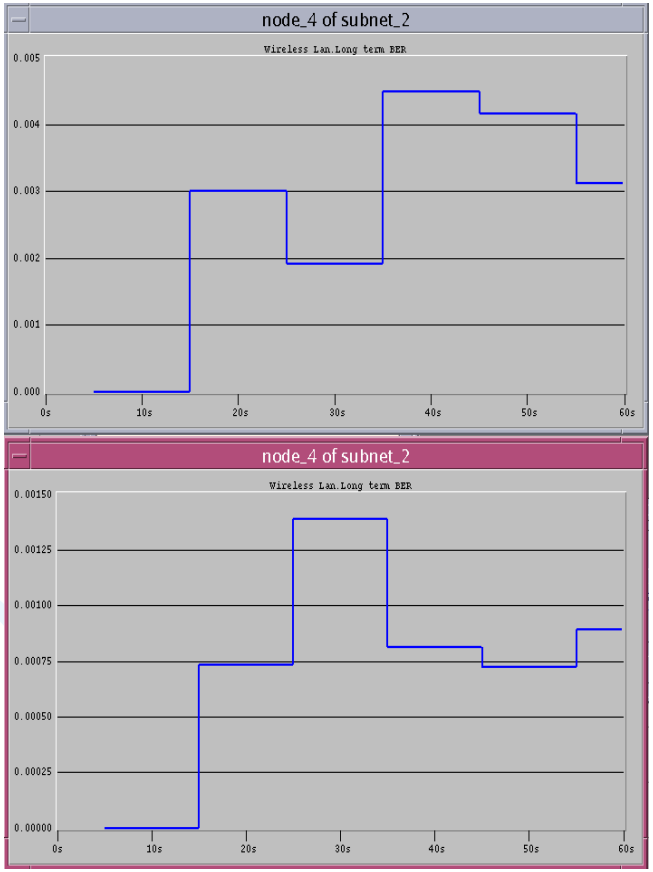
BER at a mobile terminal for the four multicast streams

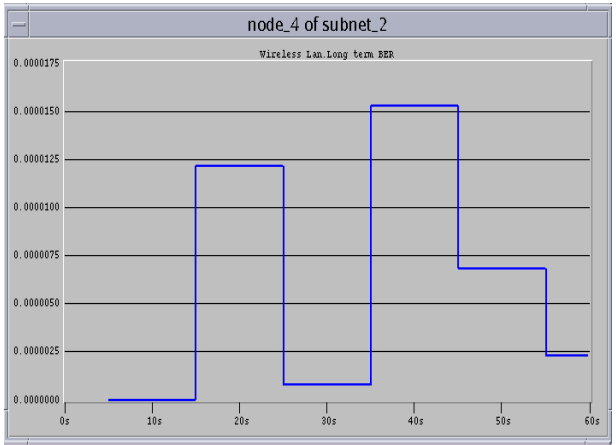


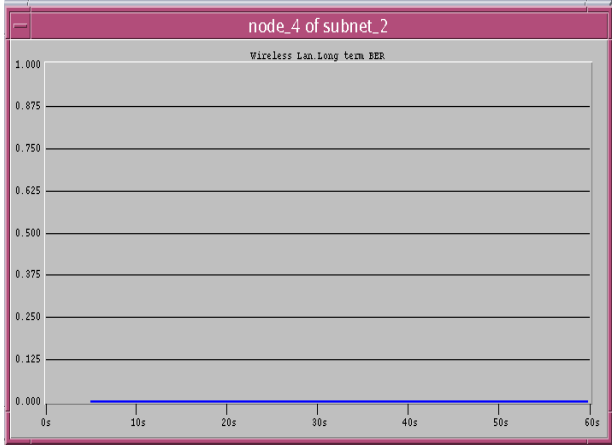
Short term average BER at a mobile terminal for the four multicast streams



Long term average BER at a mobile terminal for the four multicast streams





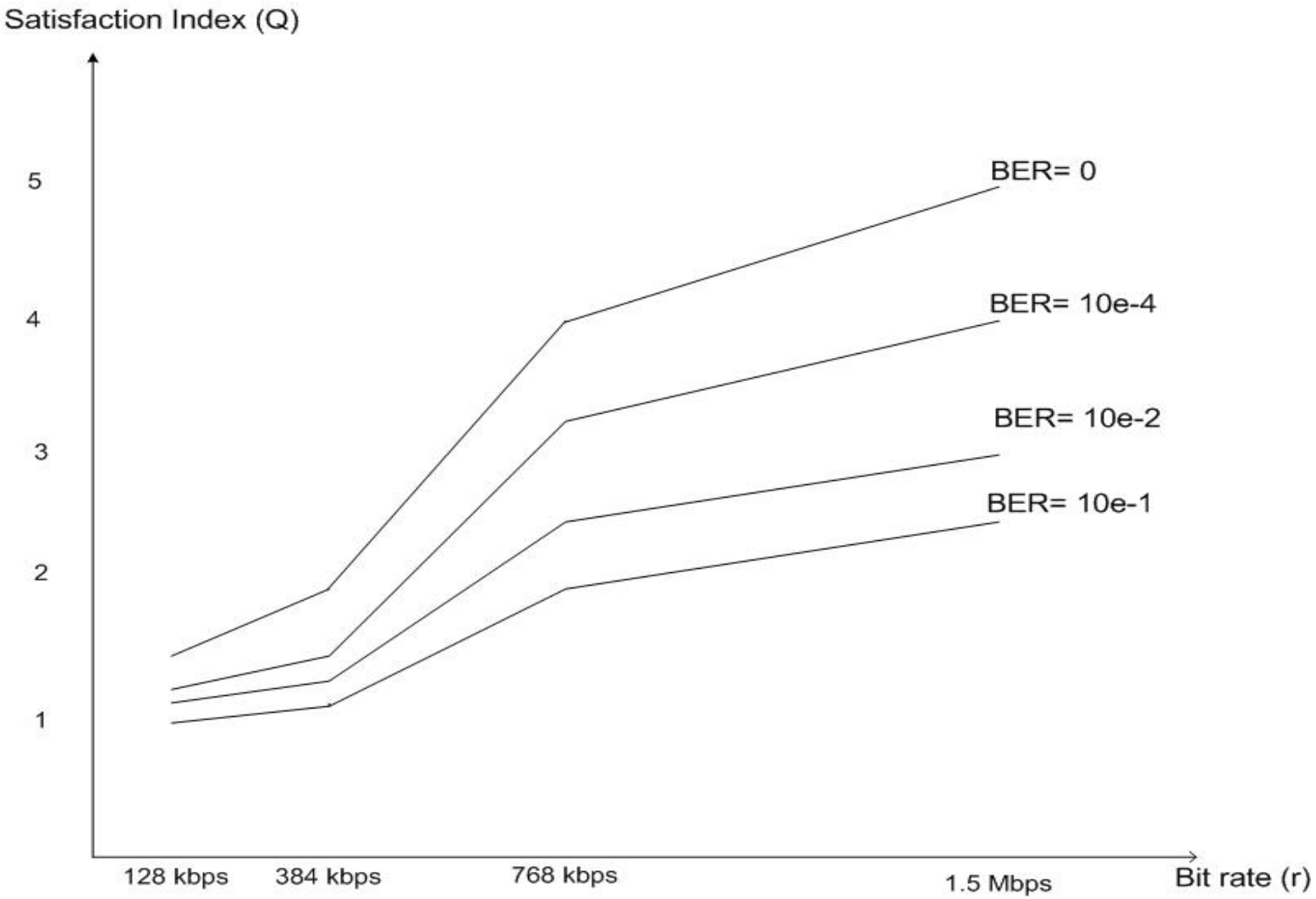


Ongoing work

The problem has been formulated as a general feedback control system with the following observation and control variables:

- BER (long term and short term BER)
- MAC multicast groupings
- Percentage/type of FEC and ARQ
- Feedback rate by mobile terminals

Piecewise linear S-Curve of Satisfaction Index



Ongoing work (Contd.)

The algorithm under consideration aims to maximize the overall system satisfaction

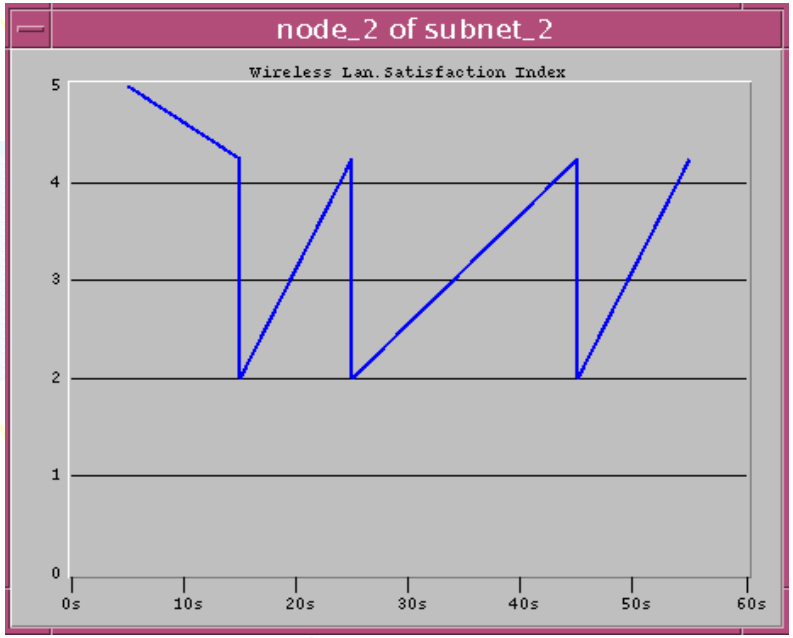
$$Q_{system} = \sum Q_i, i = 1,2..N$$

subject to the condition that the satisfaction for all the mobile terminals is greater than a threshold satisfaction i.e.

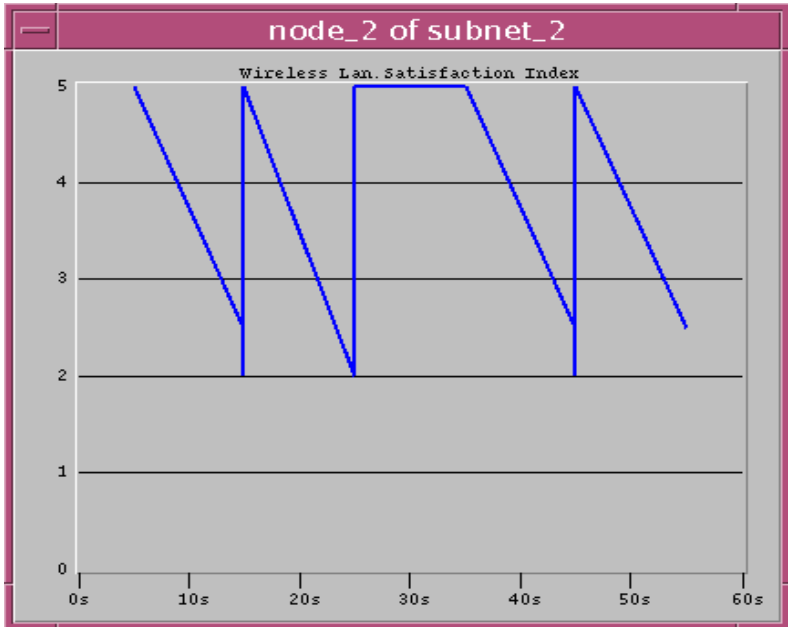
$$Q_i \geq Q_{threhsold}, i = 1,2..N$$

by selecting the appropriate multicast group (and also adjusting the FEC and/or ARQ) as a function of the observed PHY bit rate and BER for each wireless client.

Satisfaction Index of a client



Client subscribed to multicast stream 1



Client subscribed to multicast stream 2

Future Work

- Simulations with FEC and ARQ.
- Modify the system from the receiver driven scheme to a centralized scheme.