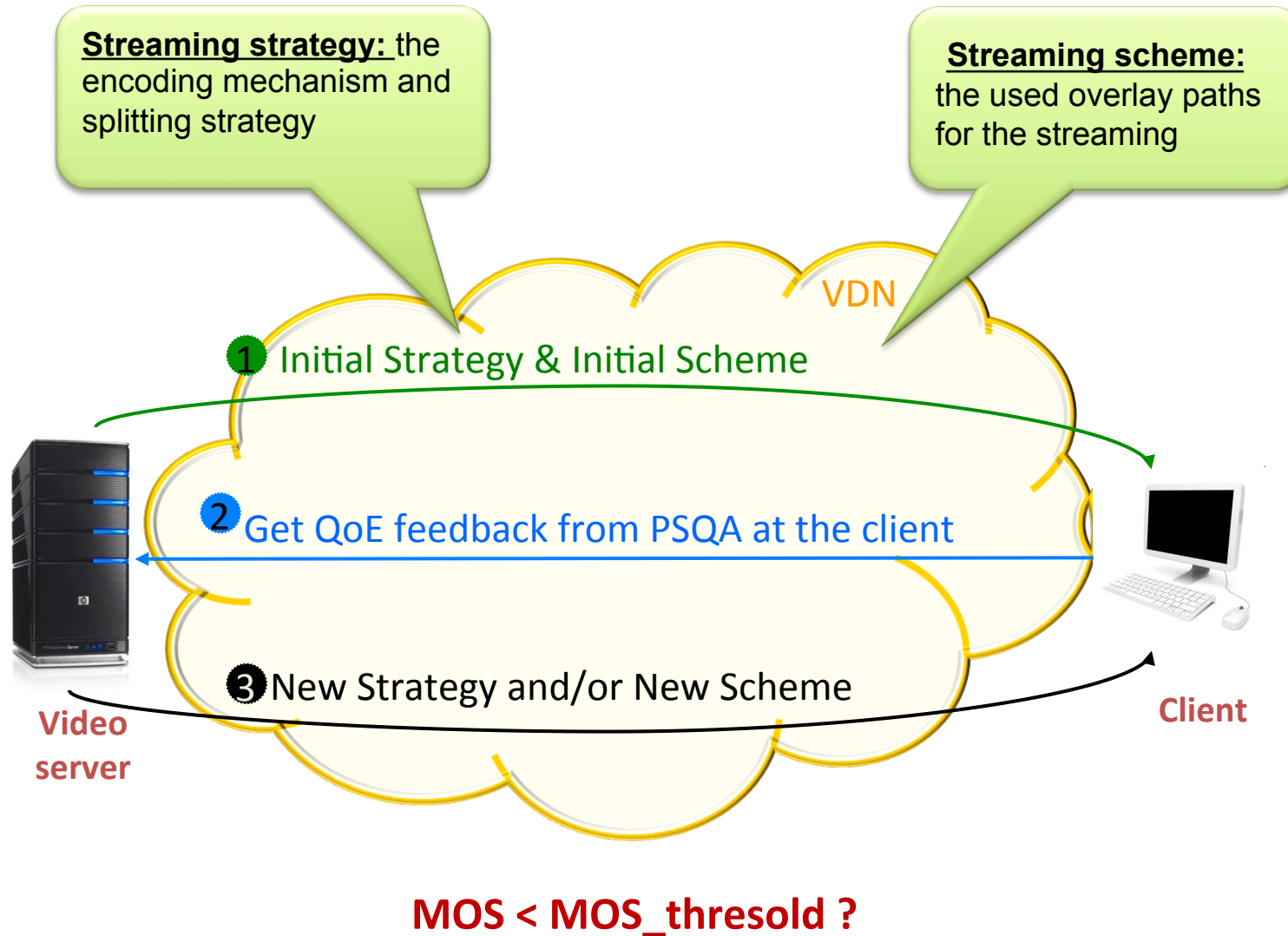


QoE-based networking

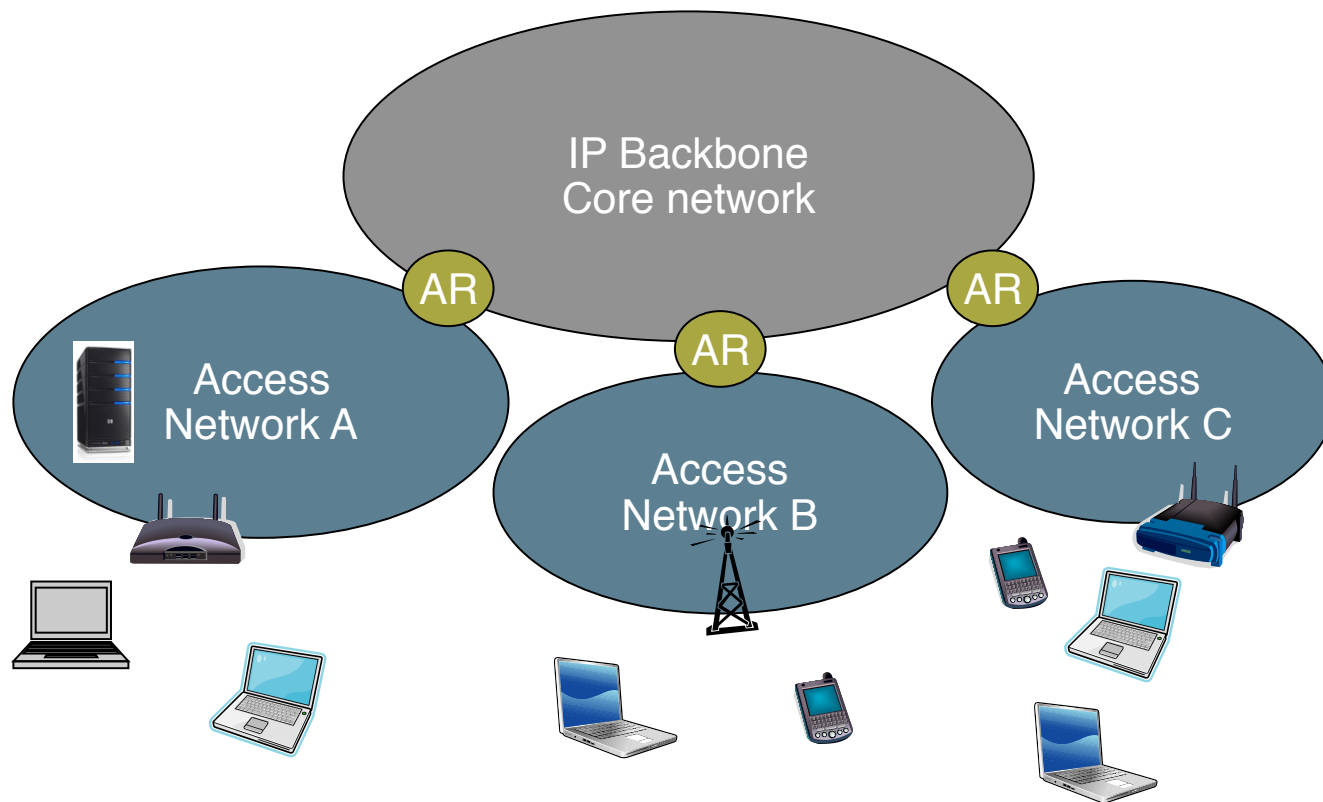
An QoE-based adaptive algorithm for
multipath video streaming
over Video Distribution Network (VDN)

QoE-based multipath Streaming



QoE based resource management in multimedia wireless networks

Resource management in multimedia heterogeneous wireless networks



– Network side

- Access control
- Scheduling and adaptation

– User side

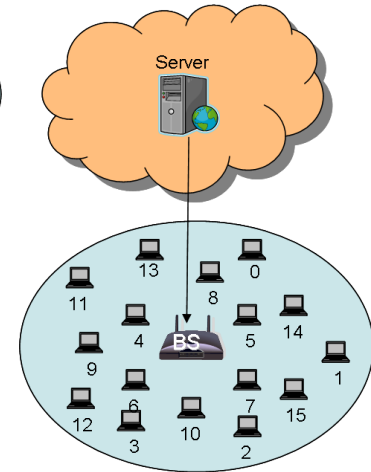
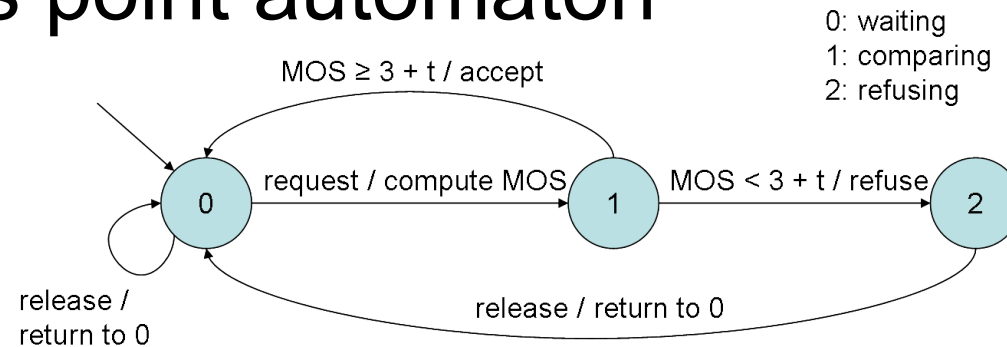
- Network selection

QoE based resource management in wireless networks

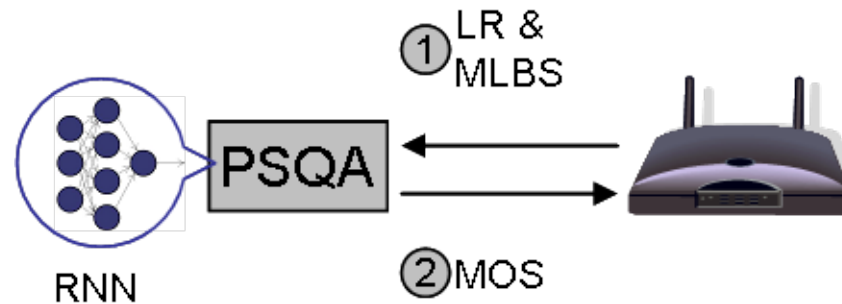
Access control

Using PSQA for access control

□ Access point automaton

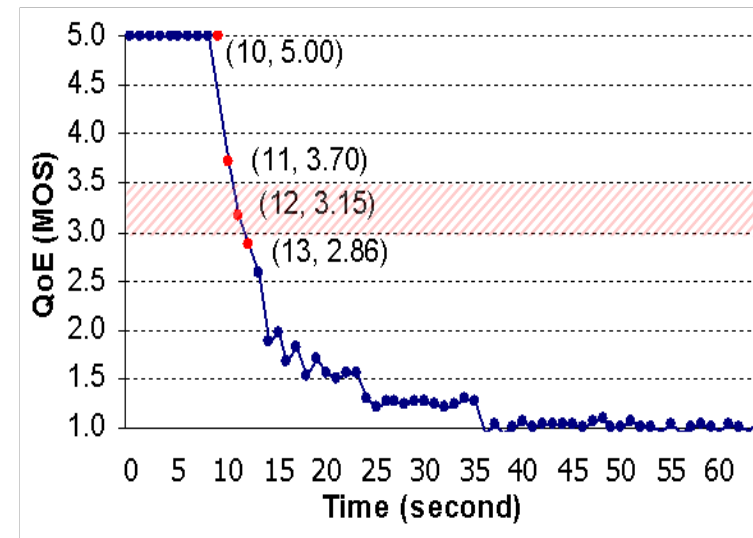
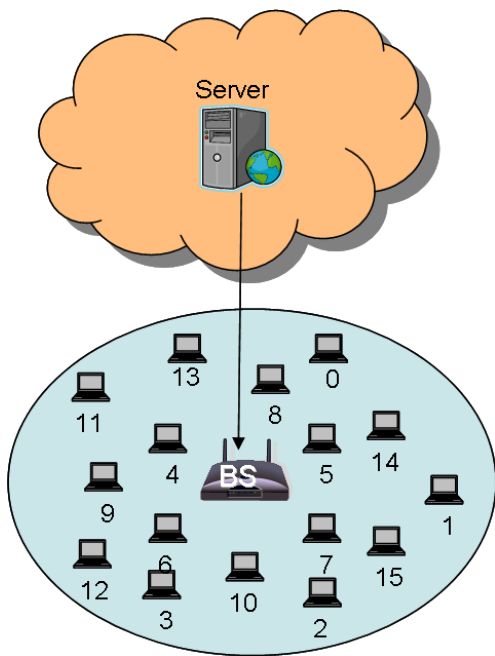


□ Interaction with PSQA



Access Control in WLANs

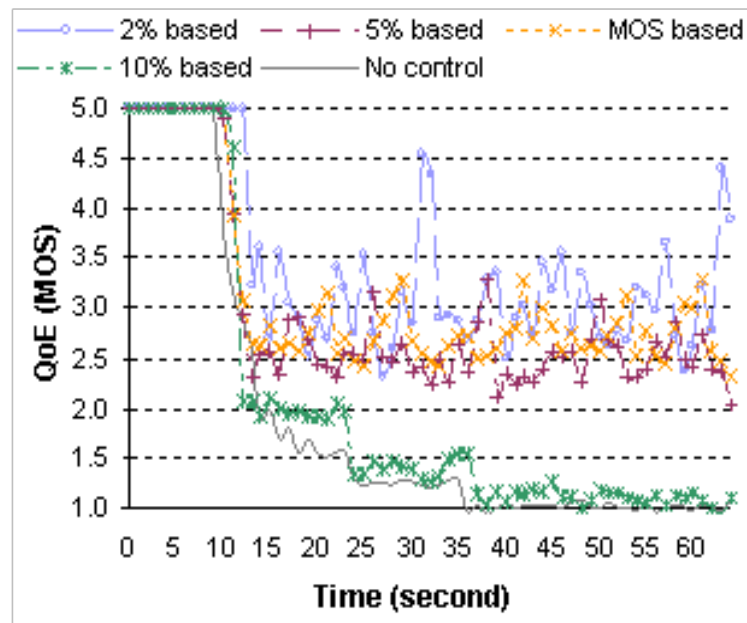
- Example scenario
- Threshold selection



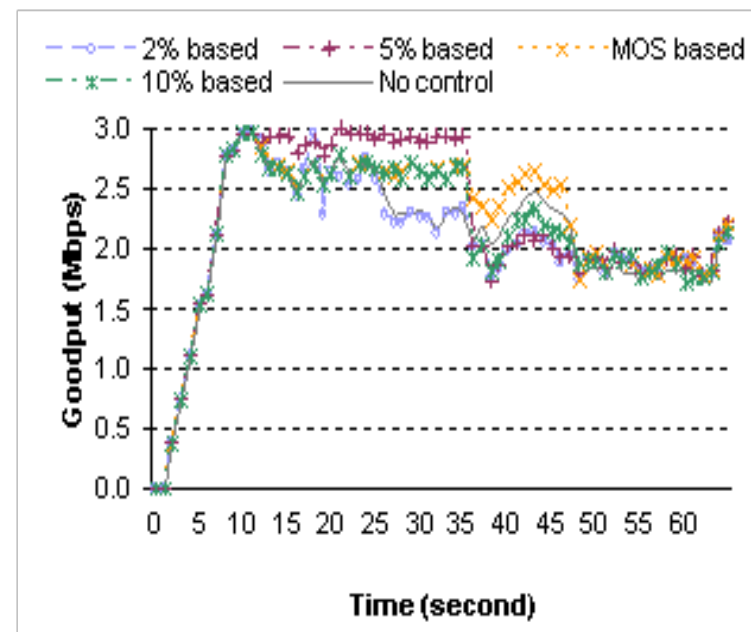
Average MOS of all ongoing users

Results

Average MOS of ongoing users



Average Goodput of all users



Performance Summary

Scheme	Max. Bandwidth utilization	Connection admitted	Average MOS
2% based	3.6 Mbps	10 flows	3.62
MOS based	4.32 Mbps	12 flows	3.35
5% based	3.96 Mbps	11 flows	3.19
10% based	4.68 Mbps	13 flows	2.17
No-control	7.2 Mbps	20 flows	2.06

Conclusion

- ❑ PSQA enables efficient QoE-based Admission control in WLANs
- ❑ It can be used in other wireless technologies since QoE is independent of technology
- ❑ Other control mechanisms such as network selection can also use QoE concept

QoE based resource management in wireless networks

Network selection

Motivations

❑ Problem:

- Network selection of users in overlapping coverage

❑ Existing solutions:

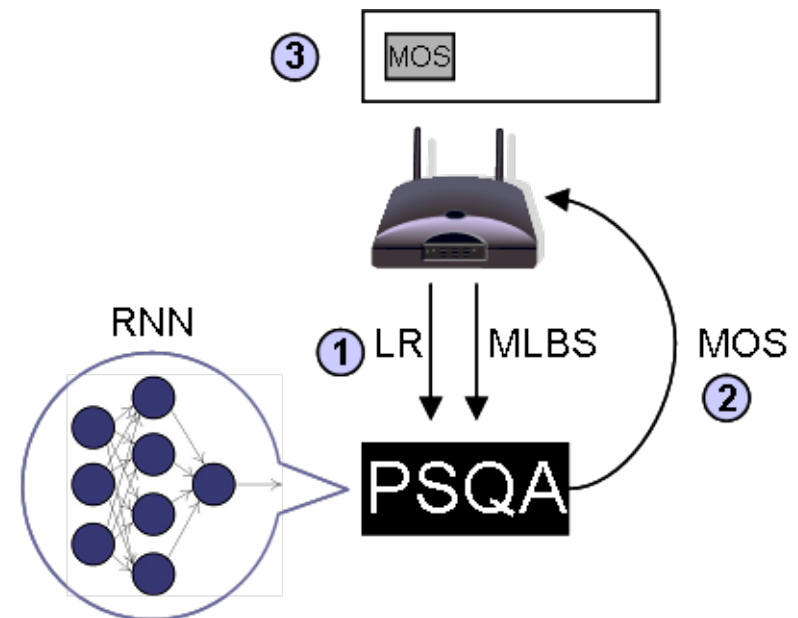
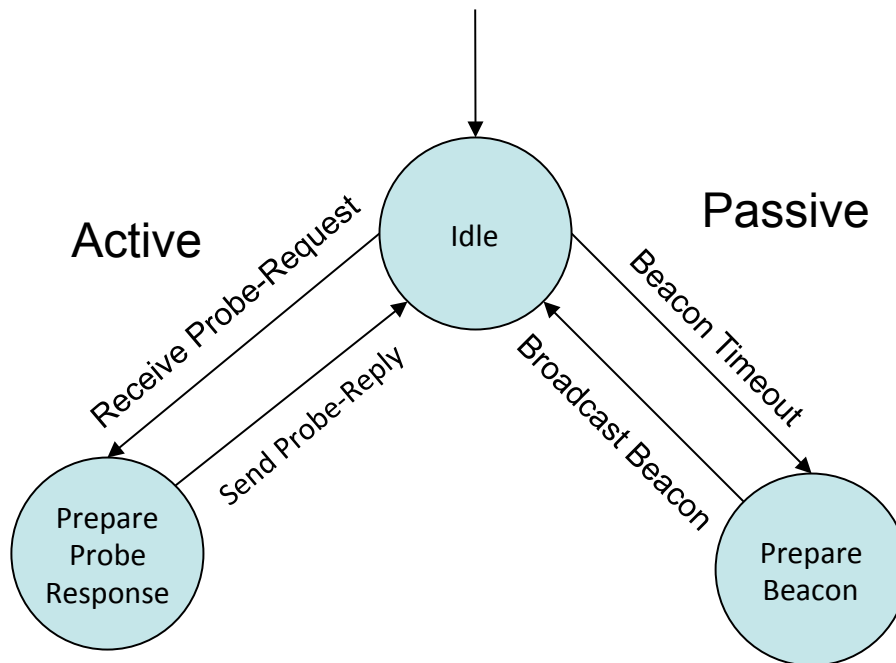
- Signal-based: SNR, PSNR,...
- Load-based: number of connection, bandwidth,...
- Mathematical technique: Fuzzy logic, game theory,...

❑ The proposed scheme:

- User-based and network-assisted approach
- Based on QoE of ongoing users

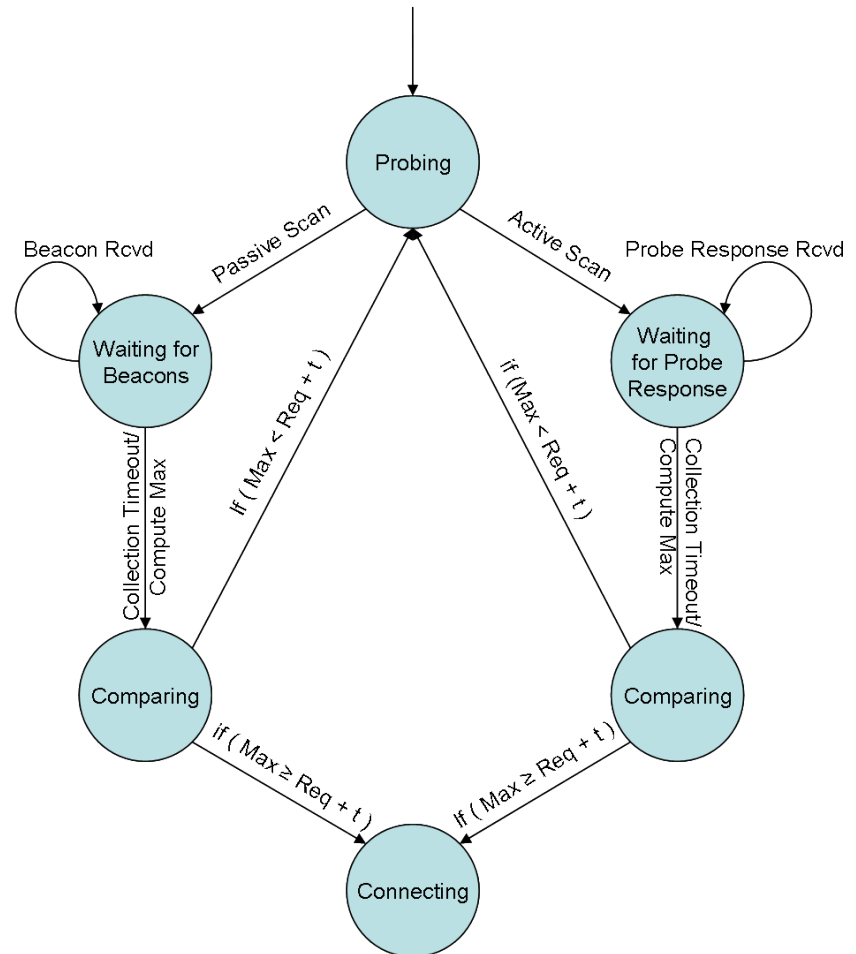
Using PSQA for network selection

- Access point's automaton
- Interaction between an AP and PSQA-box

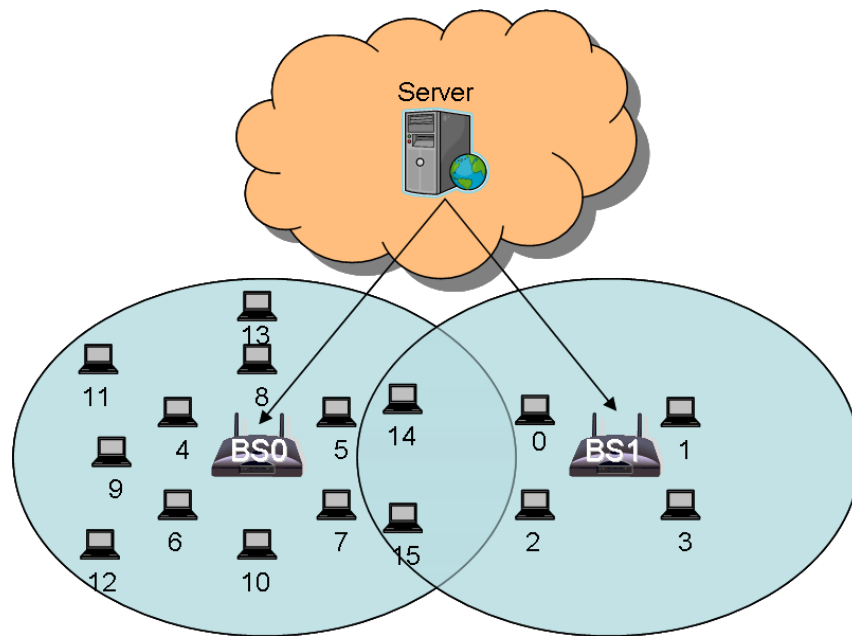


User's functionalities

- Probing
 - Actively
 - Passively
- Compute maximum MOS
- Compare with requirement + threshold



Example scenario and metrics

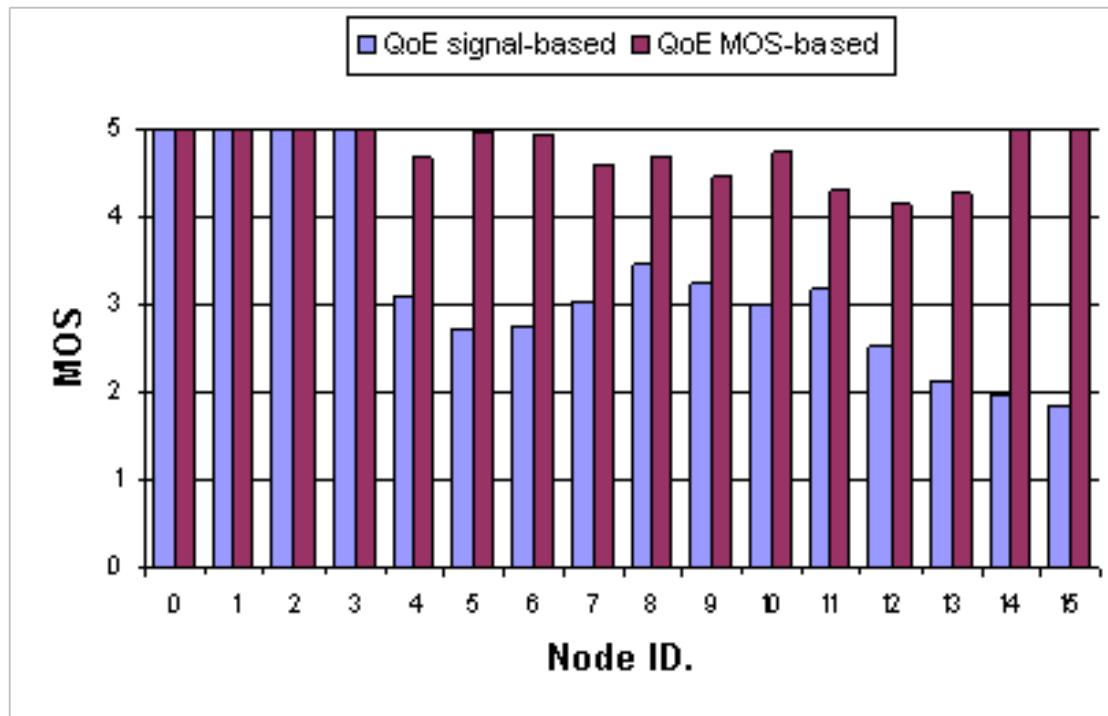
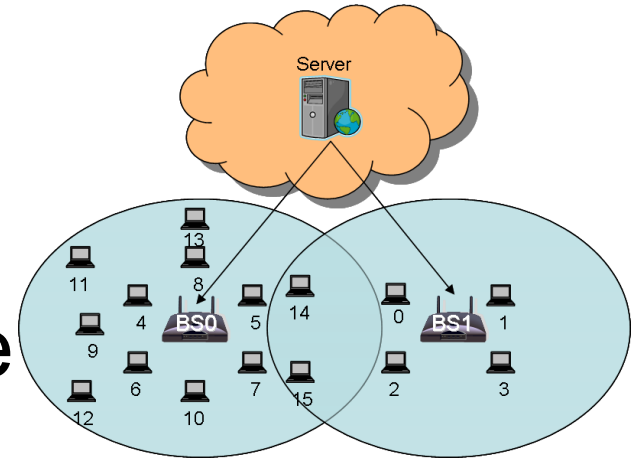


Metric considered

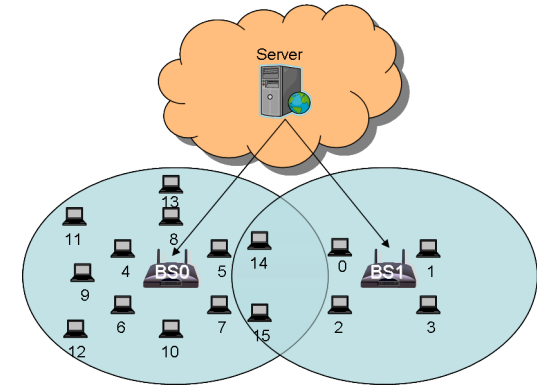
- Individual MOS of each station
- Overall MOS of the network (access point)
- Load-balancing (difference traffic load between networks)
- Fairness Index (concerning MOS fairness among users)

Results

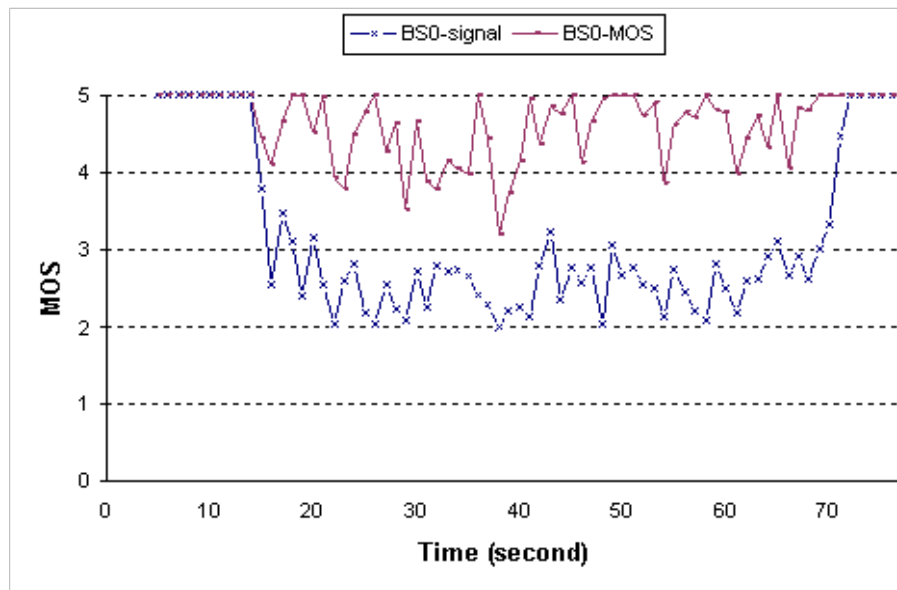
□ Individual MOS of each node



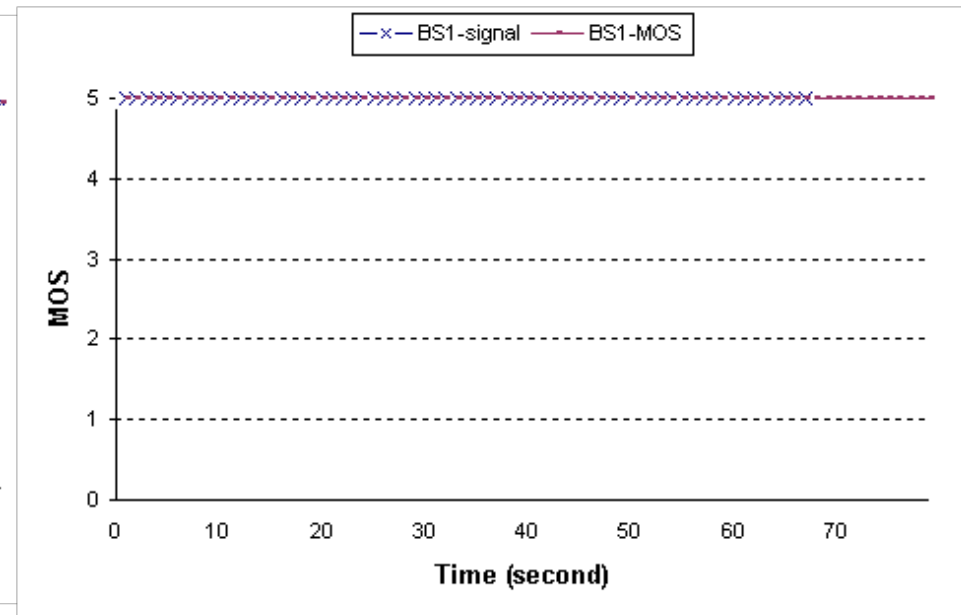
Results



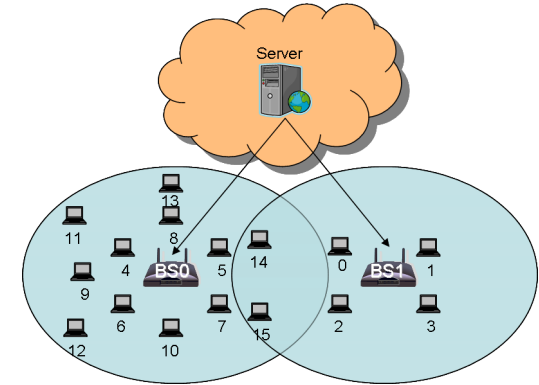
- Overall MOS at BS0



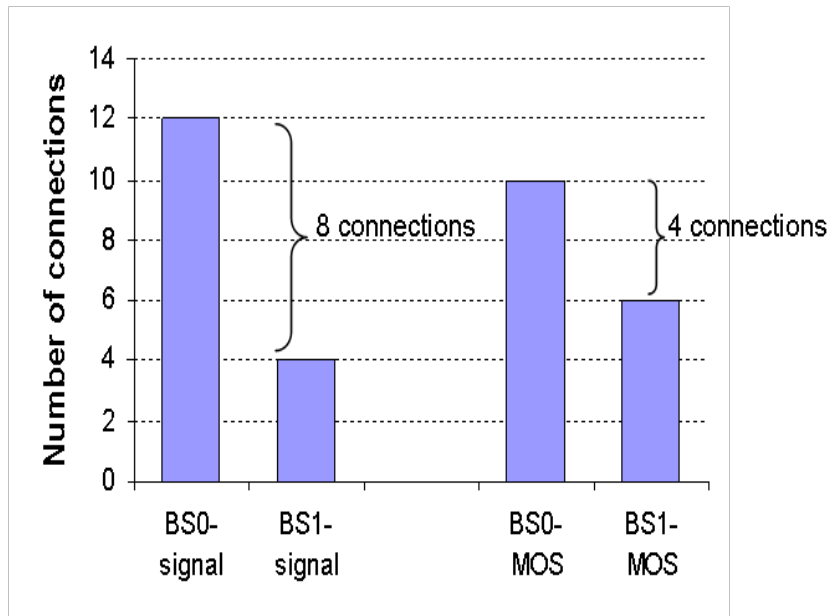
- Overall MOS at BS1



Results



- Load balancing



- Fairness Index

$$f(x_1, x_2, x_3, \dots, x_n) = \frac{(\sum_{i=1..n} x_i)^2}{n \cdot \sum_{i=1..n} x_i^2}$$

Scheme	Global	BS0	BS1
Signal-based	0.905	0.968	1
MOS-based	0.996	0.997	1

Conclusion

- ❑ QoE based approach provides better Network selection than classical signal-based approach