Lecture Notes 6/29/2016

Medium Access.

Randomized Access
- slotted Aloha
- CSMA

Scheduled Access
- TDMA
- Channelized protocols

Slotted Aloha: max throughput
$p^* = \frac{1}{n} \rightarrow \frac{1}{e}$
$\sim 36\text{-}37\%$

throughput refers if multiple users w different access probabilities

at the boundary $\sum p_i^* = 1$

$T_i = p_i \prod_{j \neq i} (1 - p_j)$

CSMA : p CSMA ← p-persistent CSMA

Contention slots $\delta \leq T_c \leq T_s$

$$\text{Throughput} = \frac{T_s n p (1-p)^{n-1}}{\delta \cdot (1-p)^n + T_s n p (1-p)^{n-1} + T_c \left(1 - (1-p)^n - np(1-p)^{n-1}\right)}$$

802.11 CSMA → FSM describing the backoff stage & counter value

↑

modelled as a Markov Chain

↓

derive steady state probabilities

↓

approximates p CSMA.

for larger packets CSMA throughput can be high 90% or more.

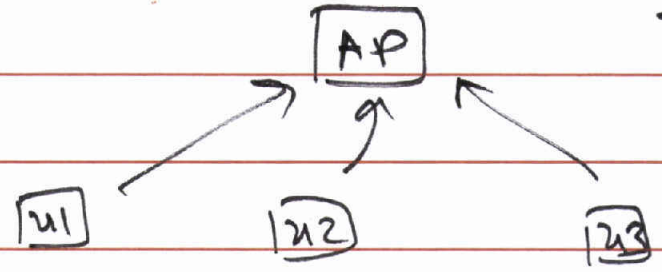
RACH channel in Cellular networks — control signalling Channel — basically slotted Aloha

Scheduled access.

Channelized systems

Channel: orthogonal dimensions
- Time
- Frequency
- codes (CDMA)

(ideally) => no interference.



with Synchronization, nodes can be preallocated a time slot.

many applications, e.g. industrial sensing, have predictable, periodic traffic.

Another example: AMR