Verification of Mobile Agents over Wireless Networks

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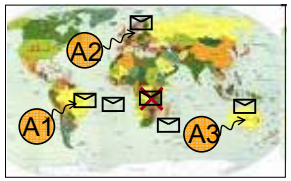
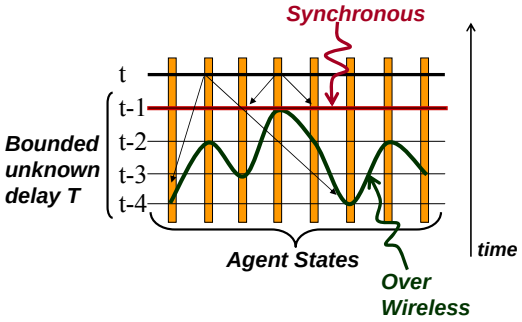
Distributed Systems with Faulty Channels



- Agents exchange messages
- Messages may be ***lost or delayed***
- Delivered in ***bounded*** time
- May contain ***old information***
- May be ***out-of-order***

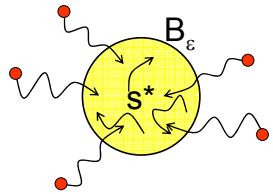
What happen if agents make their "choices" using the state of the other agents at some ***unknown time in the past*** ?

Distributed vs. Synchronous



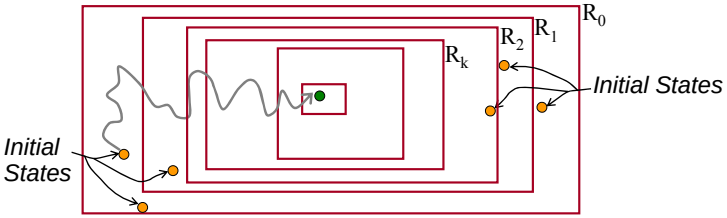
Convergence Property

$\forall \varepsilon > 0 : \Diamond\Box\, B_\varepsilon(s^*)$



From Synchronous Discrete to Continuous Distributed

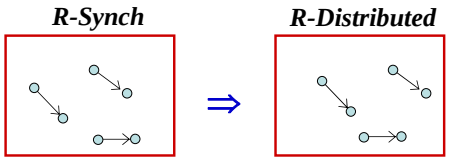
Theorem. If $\exists\{R_i\}_{i\in N}$ *rectangles*



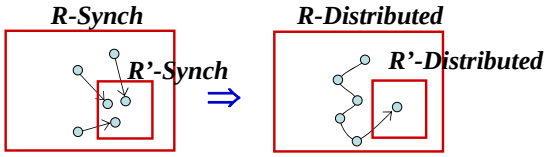
then *the* ***synchronous discrete*** *system and the corresponding* ***continuous/discrete asynchronous*** *system over* ***wireless network*** converge to the ***same equilibrium***.

Stability and Progress

R_{Synch} ***stable*** $\Rightarrow$ R_{Distr} ***stable***

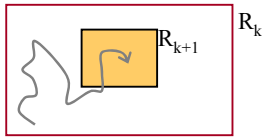


$\forall a\ R_{Synch} \xrightarrow{a} R'_{Synch} \Rightarrow R_{Distr} \rightsquigarrow R'_{Distr}$



Why Rectangles?

All possible trajectories with delayed messages remain inside the rectangle!!!



Other Shapes