

Lab 4: Assignment 2

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Assignment 2

- TCP over wireless network
- Effectiveness of RTS/CTS
- Directional antenna

TCP over wireless networks

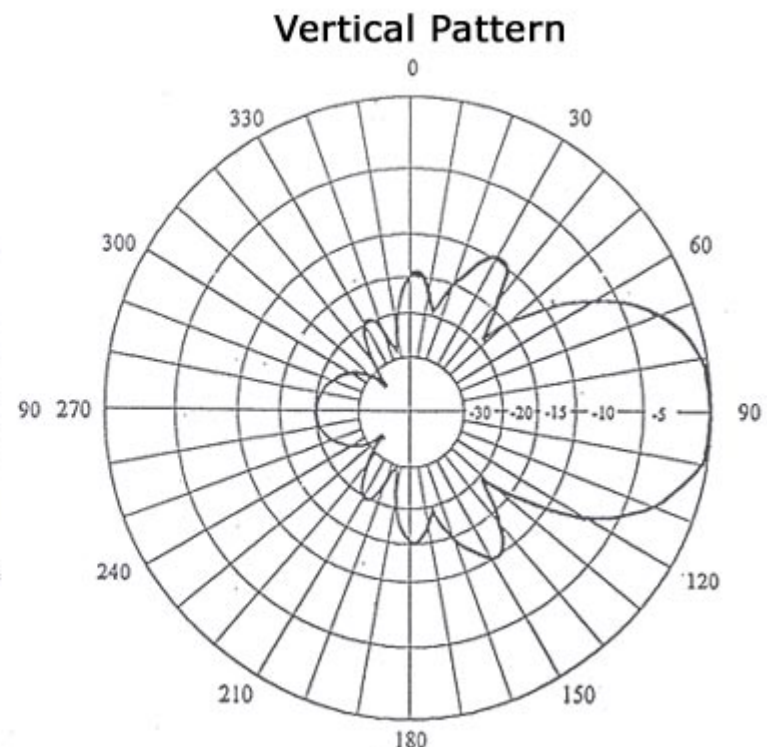
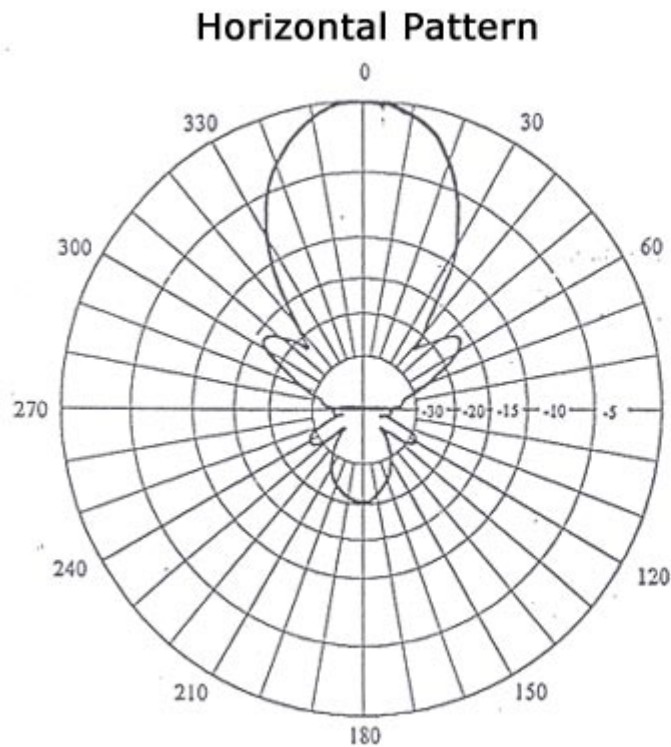
- Challenges:
 - Sensitive to packet loss
 - Overhead of ACK
- Approaches for improvement
 - Adapt TCP to wireless environment
 - Get help from link layer
- Your task
 - Evaluate how TCP perform over 802.11

Effectiveness of RTS/CTS

- Co-channel interference may cause hidden terminal problem
- RTS/CTS is designed to deal with hidden terminal problem
- Your task
 - Evaluate the effectiveness of RTS/CTS with real experiments

Directional antenna

- N-element Yagi antenna
- Configurable using Java

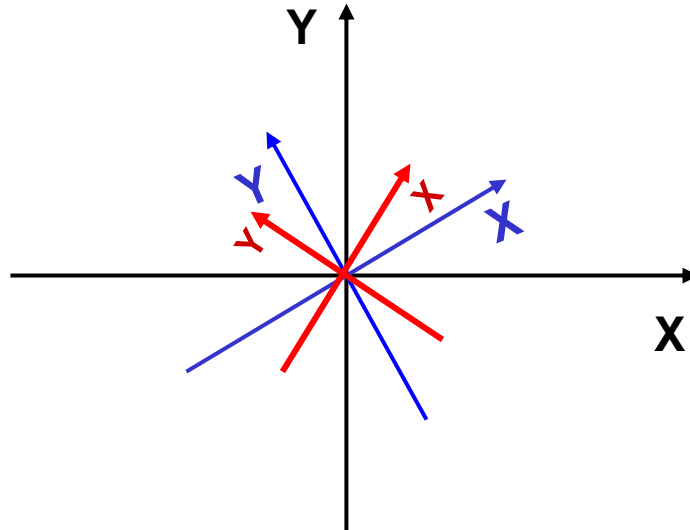


Coordination

- In hw1, you specify the position of wireless nodes using the coordination from **Emuworld**
 - Reference coordination
- Each **Movableobject** has its own coordination system
 - **EmuNode** and **Antenna** are **Movableobject**
 - Fixed z axis (0,0,1)
- **Movableobjects** use their own coordination system to describe their orientation
 - **EmuNode** can point to a direction different from its moving direction
 - **Antenna** can be steered independent to the orientation of the **EmuNode**

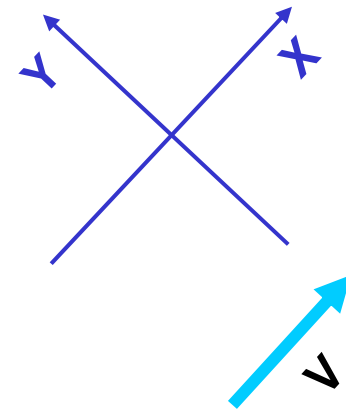
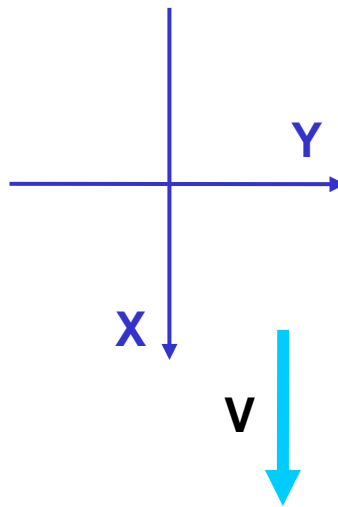
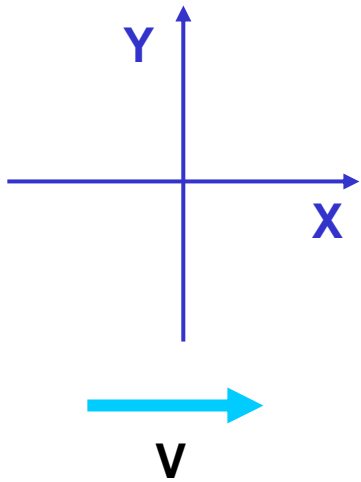
Coordination

- only show \mathbf{x} , \mathbf{y} axis (by right-hand rule you can get \mathbf{z} axis)
- \mathbf{x} , \mathbf{y} : EmuWorld coordination
- \mathbf{x} , \mathbf{y} : EmuNode coordination
- \mathbf{x} , \mathbf{y} : EmuNode orientation



Coordination

- Coordination follows MovableObject's velocity

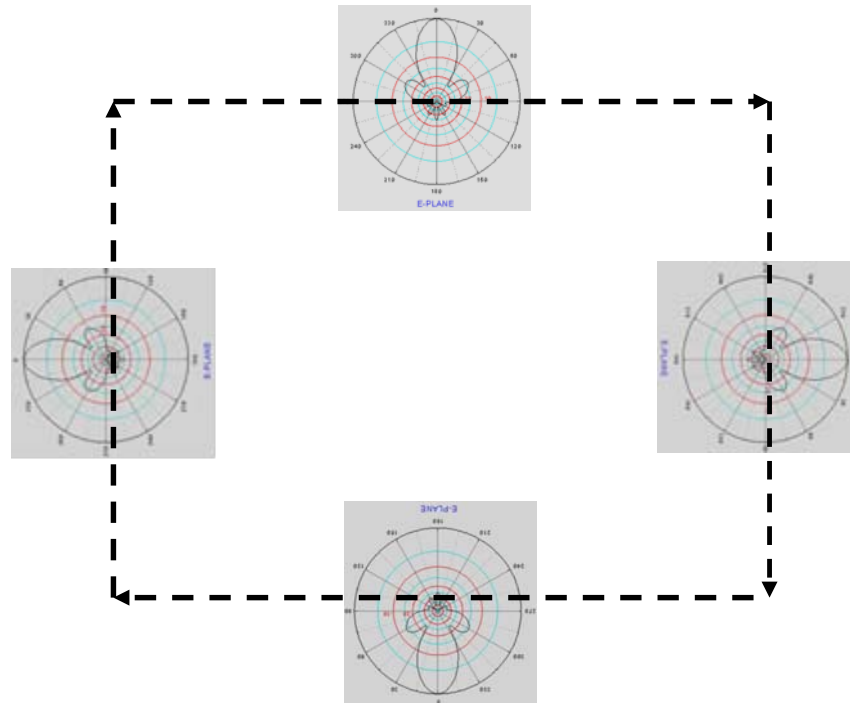


Orientation mode

- Fix: orientation is fixed (related to its own coordination)
- Parent: set the orientation to its parent's orientation
 - If a node has an antenna. The node is the parent of the antenna
- Velocity: let the orientation follow the velocity

Orientation mode

- Yagi antenna
 - Orientation mode: Fix
 - Orientation X axis: (0, 1, 0)



Demo1

- Use directional antenna in the emulator
 - Set up directional antenna in experiment script
 - Configure the orientation with java code

Event handling

- Event handling uses listener pattern
 - Register listener at a component
 - Component creates some event object and notifies all listeners by calling a callback
- Different listeners
 - MOOrientationListener
 - MOPositionListener
 - MOVelocityListener
 - RSAListener
 - SegmentListener
 - WaypointListener

WaypointListener

- Event: node reaches the waypoints
- Example: `WaypointListenerExample.java`

RSAListener

- Event: relative spatial attributes change
- To monitor position (velocity ...) changes
`node.getPosition().addListener(listener,
 triggerInterval,
 triggerMagnitude)`
- Example: `RSAListenerExample.java`