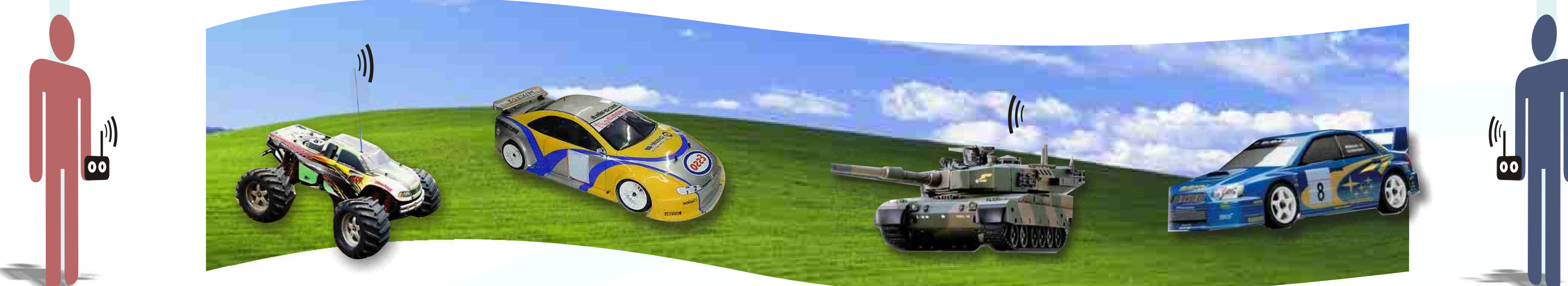


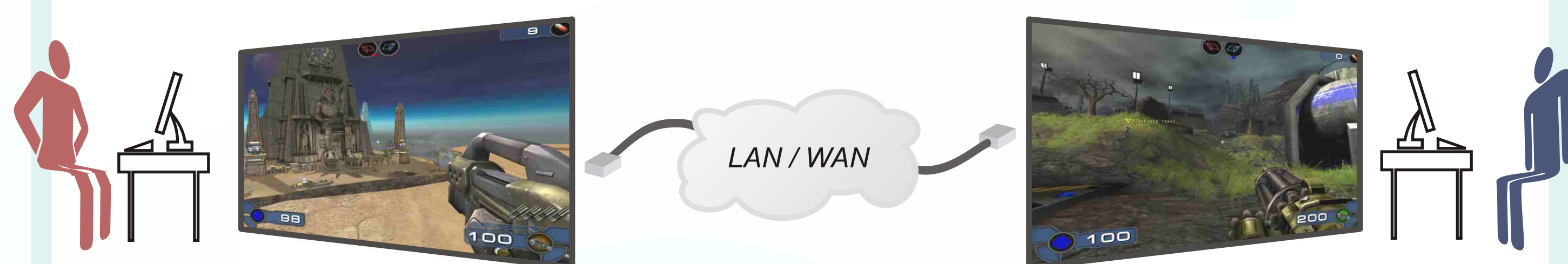
Context: Entertainment

- Physical world: **remote controlled (RC) toys**
 - Many types (cars, trucks, airplanes, military, etc.)
 - Different complexities (novice / ... / amateur) and prices
 - Operated remotely by a player with a controller



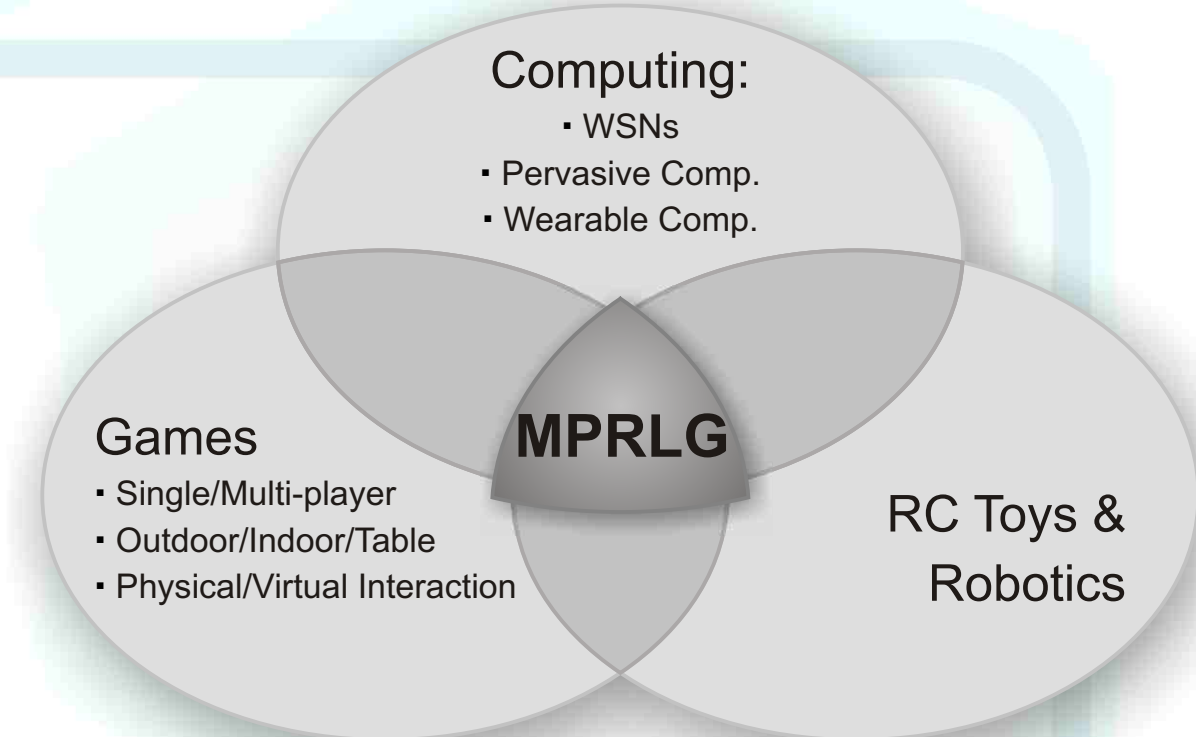
- Fun... but playing mode is the same since its conception:
 - Find a spot, play until no energy is left

- Digital world: **multi-player computer games**
 - Evolution from single-player games, computer opponents
 - Replaced with human players @ the other side of the network
 - Increasing no. of *gaming modes* like deathmatch or cooperative



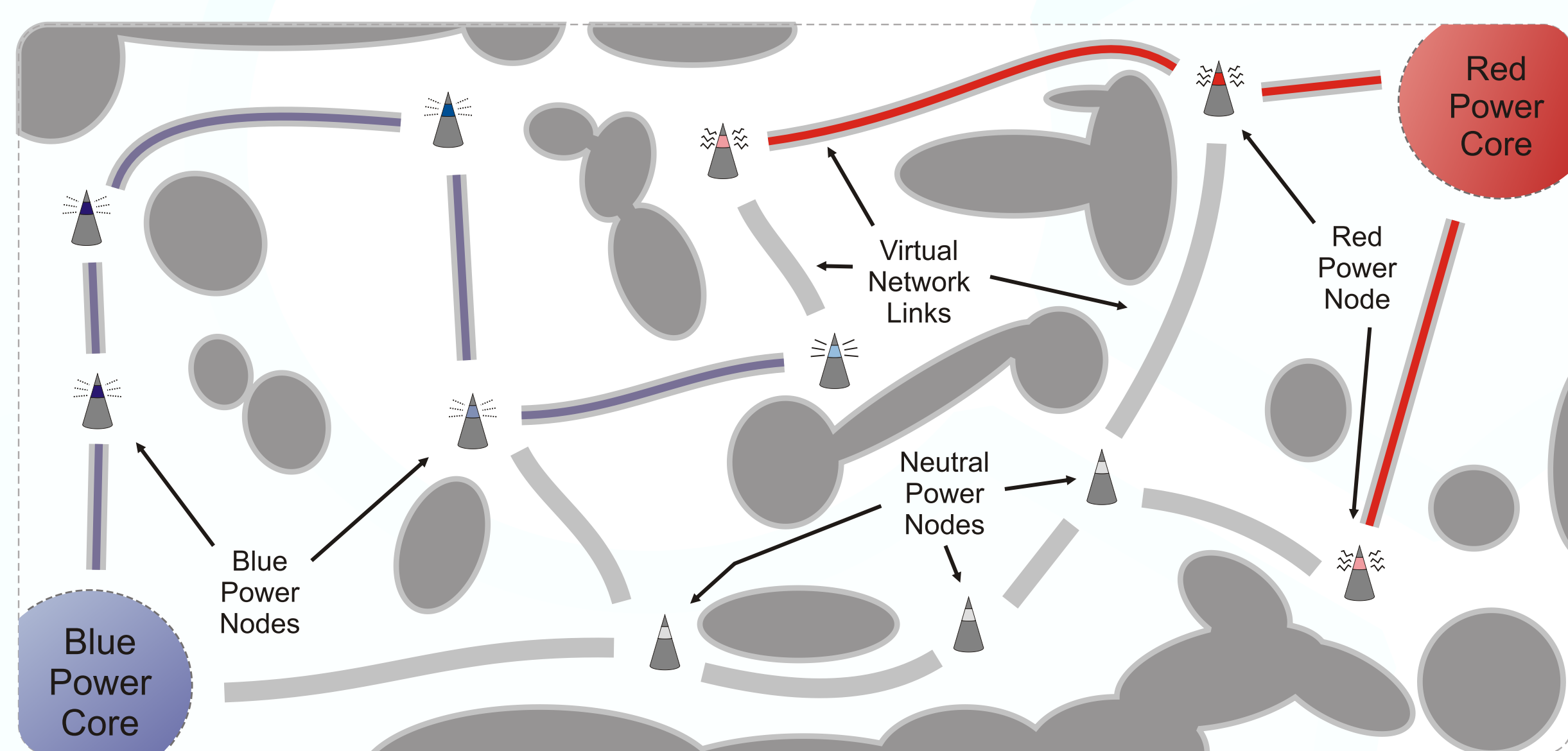
Goals

- Enrich participants experience by combining multiplayer interaction with RC toys
- No platform exists that bridges these worlds!
- Glue: a wireless sensor network (WSN) infrastructure:
 - Gaming framework for generic team-based, goal-oriented gameplay



Example: Onslaught

- Teams start pitted against each other
- Goal: conquer opponent's power core
 - Capture and hold strategic points a.k.a. power nodes
 - Power nodes are initially neutral
 - Conquered by staying around them
 - Power cores similar, but can't be healed back



Application Requirements

- Deploy game gadgets in the gameyard
- Game components (RC toys, gadgets):
 - Sense and compute data
 - Signal different game occurrences
 - React in consequence
- Need for a WSN infrastructure that provides:
 - Model for specification and assignment of rules to components
 - Placeholder for rules to be triggered and actions executed
 - Means to disseminate across parties (e.g. controllers)

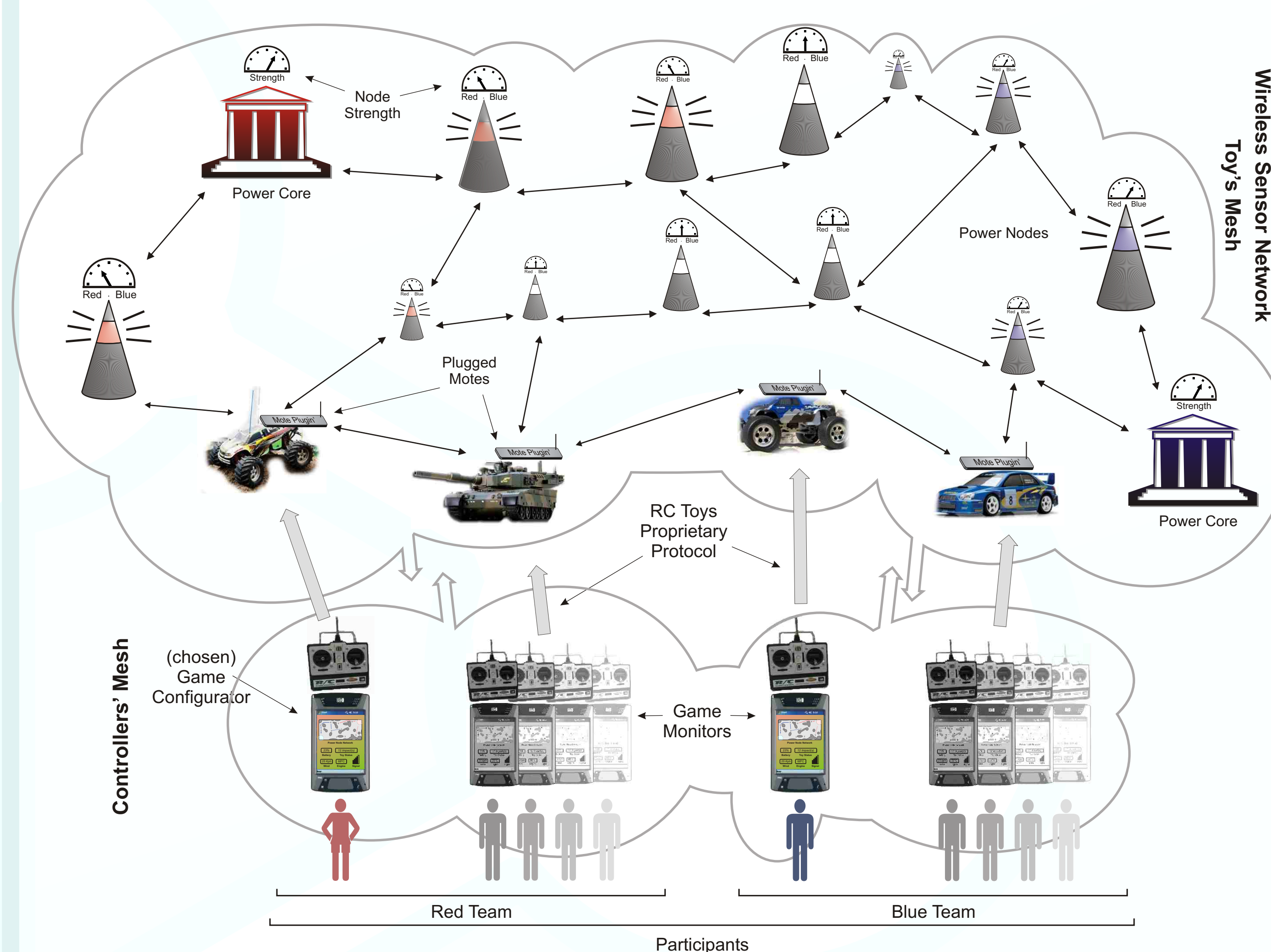
Pluggable Approach

- Enable game components to sense, compute and communicate
- Unidirectional channel between controller and RC toy
 - Plug a sensor node into the toys to get feedback from them
 - Game gadgets built with sensor node



Deployment Model

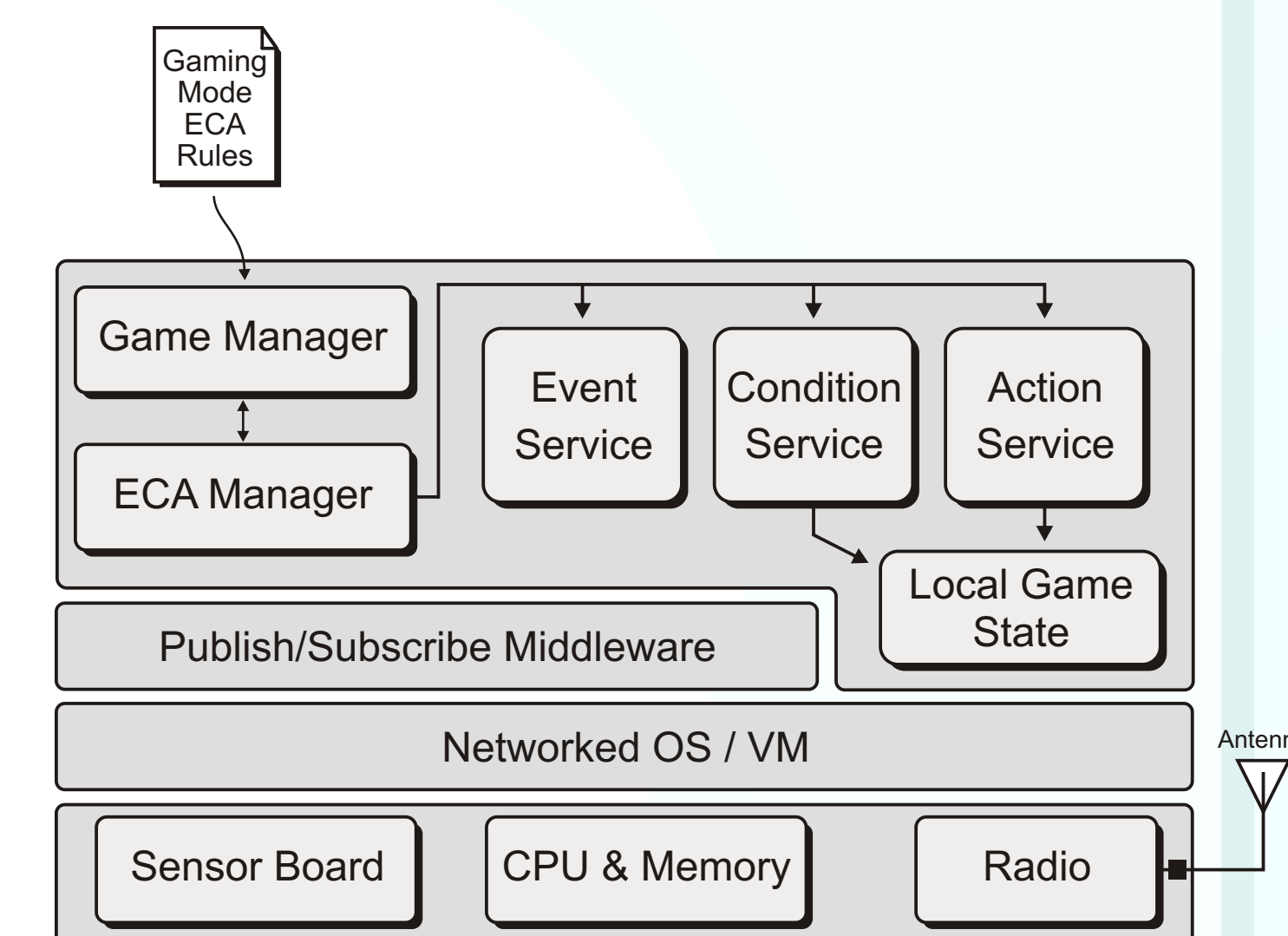
- Toys, gadgets and controllers form the WSN mesh
 - Transports sensed and computed game-related information
 - Uses different radio band than RC toy ↔ controller



- Gaming Infrastructure - Technical challenges:
 - Gaming modes specification
 - Game-Player interaction
 - Configuration and deployment
 - Data dissemination

Infrastructure Design

- Game Manager provides game components' identification, coordination and calibration
- Gaming mode described with ECA Rules:
 - Rule engine executes rules
 - Sensors & neighbors feed service with events
 - Local state provided for efficient condition evaluation and action execution
- Communication:
 - Asynchronous, wireless, multi-hop and short range
 - Publish/subscribe paradigm to distribute game-related events
 - Allows different routing implementations, e.g., energy-savvy
- Networked OS / VM / Platform:
 - Access to low-level sensor board, radio and CPU cycles
 - Usage of more powerful devices (e.g., I-Mote 2, SunSPOTs)



Conclusions & Beyond

- Novel app. of pervasive technologies: RLMPGs & RC toys
- Delineated Architecture Relying on WSN
 - Working on a prototype
 - Explore other related areas with this infrastructure