AOI CAST TOLERANCE BASED COMPASS ROUTING IN DISTRIBUTED VIRTUAL ENVIRONMENTS

Michele Albano, Luca Genovali, Antonio Quartulli, Laura Ricci

NETGAMES '09

Paris, November 23-24th, 2009
A VORONOI BASED APPROACH FOR P2P DVE

• Definition of a Voronoi Tessellation of the DVE
  - each peer is paired with a DVE region including the points of the DVE closer to it w.r.t. any other peer

• P2P Overlay: defined by the Delaunay Triangulation corresponding to the Voronoi Tessellation

• Our proposal: AOI-cast, a new strategy to propagate the heartbeats in the Area of Interest of a peer
  - based on reverse compass routing, a routing algorithm exploiting the properties of the Delaunay Triangulation
  - introduces a Tolerance threshold to guarantee the delivery of the heartbeats in presence of network delay
A VORONOI BASED APPROACH FOR P2P DVE

- **Compass Routing:** $A_5$ chooses $A$ as next hop because
  
  $\angle\text{Root}A_5A < \angle\text{Root} A_5 A_1$ and $\angle\text{Root} A_5 A < \angle\text{Root} A_5 A_4$

- Each node reverses compass routing to detect its sons in the AOI-cast tree: $A_5$ is $A$ next hop in the AOI-tree

- **Routing algorithm:**
  
  - **Neighbour Ordering:** a node $n$ orders its Voronoi neighbours according to a counter-clockwise ordering
  
  - Define a set $S$ of conditions to detect neighbour regions intersecting the border of the DVE
  
  - **Children Detection:** for each neighbour $p$ of $n$ the angle evaluation phase is executed by considering $\text{pred}(p)$ and/or $\text{succ}(p)$, depending on the conditions in $S$