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# **AOI CAST TOLERANCE BASED COMPASS ROUTING IN DISTRIBUTED VIRTUAL ENVIRONMENTS**

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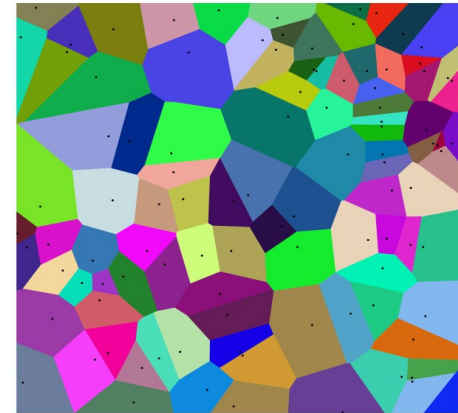
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# A VORONOI BASED APPROACH FOR P2P DVE

- 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

$$\angle \text{Root} A_5 A < \angle \text{Root} A_5 A_1 \text{ and } \angle \text{Root} A_5 A < \angle \text{Root} A_5 A_4$$

- 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  $S$

