Distributed UDP Ping

- UDP Ping is a program executed on a monitor $m$ that gives an interface $i$ of a target router $r(t)$, depending on the location of the monitor.

- Using UDP Ping on a distributed set of monitors $M$, multiple interfaces (hopefully all the interfaces) of a target router are gathered.

- Counting the different interfaces observed gives the degree of this router, $deg(r(t))$. 

UDP Ping

- A monitor $m$ sends an UDP message towards an unallocated UDP Port towards a target address $t$.
- The router $r(t)$ that owns this address uses one of its interfaces, $i(m, r(t))$, to generate the ICMP Destination Unreachable message.
- The interface $i$ depends of $m$. 
UDP Ping
Distributed UDP Ping

- Using multiple monitors, we collect different interfaces of a target $r(t)$:

$$M(r(t)) = \{ i(m, t) \mid m \text{ in } M \}$$

- If $M$ is properly distributed, then $M(r(t))$ contains all the interfaces of $r(t)$.

- In this case,

$$|M(r(t))| = \deg(r(t))$$
Distributed UDP Ping
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• Input :
  - A target address, $t$
  - A list of monitors, $M$

• Output :
  - A list of triplets $(m, i, t)$, such that $i$ is the interface used by $r(t)$ to reply to $m$.
  - The size of $\{ i \mid (m, i, t) \}$, which equals to $\deg(r(t))$ if $M$ is distributed enough.