Dynamic Address Routing (DART)
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Routing by Dynamic Addressing

- Routing address and node identity are kept as two separate numbers.
- Routing address reflects the node’s location in the network topology. Moving nodes change address.
- Nodes that have similar addresses are physically close, making route aggregation possible.
- A distributed node lookup table maps identifier to current node address.

Efficient Address Allocation

- Routing addresses form a virtual binary tree.
- Invariant: All nodes within any given subtree can communicate using only nodes in that subtree.
- Nodes can figure out a valid address by listening to neighbors’ periodic routing updates.

Making Routing Scale

- Each node keeps $\log N$ routing entries.
- Routing is done by prefix; all nodes in a triangle above are covered by a single entry.

Routing Table Size vs. Network Size

- Average routing table size < $2^{\log N}$!
- Low average path stretch, 30-35%, so route aggregation is not hurting us much.

Efficient Address Lookup: ID -> Address

- Maps node identity to current routing address.
- Distributed hashtable, utilizing existing routing layer state for efficiency.
- Upon connection establishment, the current routing address of the destination is looked up in the table.
- Hierarchy of local and global lookup tables ensures locality of operations, crucial for scalability.

Path Stretch vs. Network Size

- Current protocols were designed for up to several hundred nodes.
- Reactive protocols (AODV/DSR) rely on flooding to establish routes.
- Proactive (DSDV) keeps one routing entry per node in the network!
- The Internet has scaled well so far, but was not designed for mobile, wireless terminals.

Conclusion

- Dynamic Address Routing is a promising new approach to ad hoc routing.
- Simulation results show that our approach has the potential to reliably outperform current approaches in large networks.
- Dynamic Addressing promises to take ad hoc networking to the next level.