Ad Hoc Networking of Bluetooth Devices

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Bluetooth devices are organized in master-slave configurations known as Piconets. Up to seven slaves can be active in one Piconet. Multiple Piconets can be interconnected into a Scatternet using nodes in MASTERSLAVE state.

Current Bluetooth devices have properties that need to be taken into account when designing and implementing algorithms:

- While in inquiry() or connect() a node is not visible.
- While in SLAVE or MASTERSLAVE a node cannot do inquiry() or connect().
- Inquiry() and connect() have long delays and no a priori guarantee.
- Asymmetry: an inquired node does not notice the inquiry().

We cannot form arbitrary multihop topologies using Bluetooth but we can form trees using a simple, robust, distributed scheme running independently on all the nodes. These nodes must all be in visible range from each other.

```
loop {
    inquiry();
    forall (nodes_found) do {
        while (not max_degree) connect();
    }
}
```

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TreeNet is an interactive game that you can play with the BTnodes on the table. The objective of the game is to visualize the topology of the tree network configuration formed spontaneously by the BTnodes.

Try to sort out the tree topology of the networked BTnodes

The BTnodes are configured to search and connect to other nodes in the vicinity. While doing so, they output status information to the debug port and via their LEDs.

Device Status Codes

- **IDLE, MASTER** – single flashing
- **inquiry()** – single flashing and single constant on
- **connect()** – both devices show “knight-rider” light
- **disconnect()** – both devices show alternate flashing pairs

For visually discovering the tree topology different commands for requesting visual light sequences have been defined. They can be input at any node that is part of a tree configuration via the debug port, are broadcast through the tree to the destination nodes and then executed.

**Topology Discovery Command Codes**

- **br** – Blink Root – root node flashes once
- **ba** – Blink All – all nodes flash once
- **bl** – Blink Leaves – all leaves flash once
- **b** – Blink Levels – starting from the root, all levels flash once
- **bw** – Blink Walk – a complete walk through the graph is displayed

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We cannot connect 50 or more Bluetooth devices into one large ad hoc networking topology.