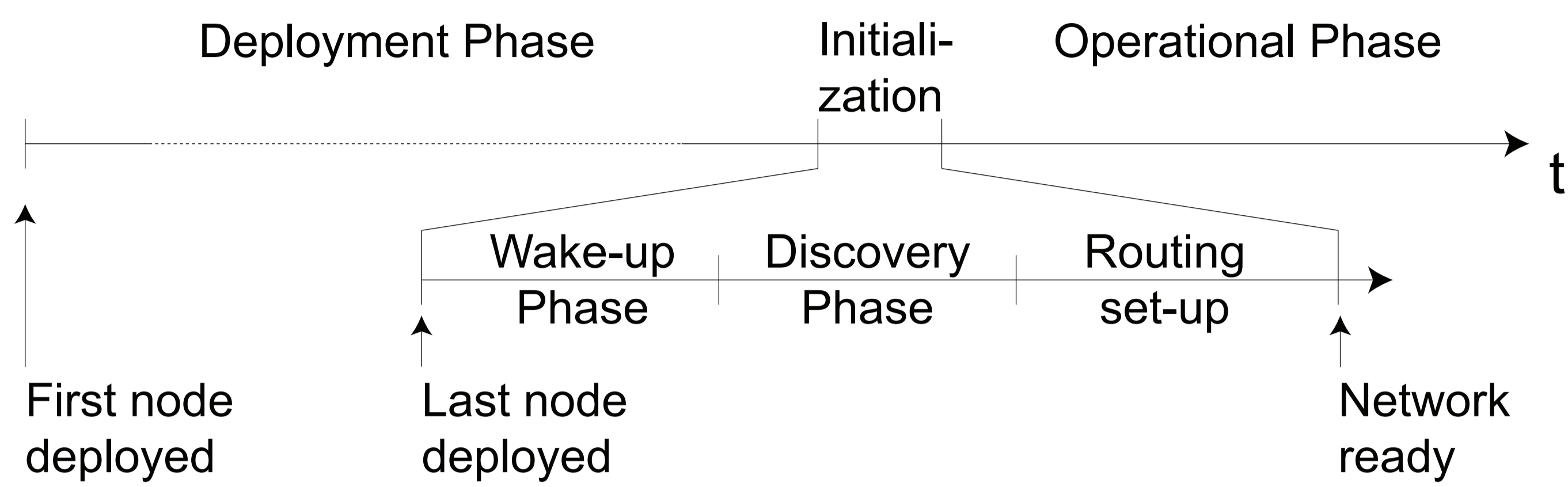


NoSE: Efficient Initialization of WSNs

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Initialization of Wireless Sensor Networks

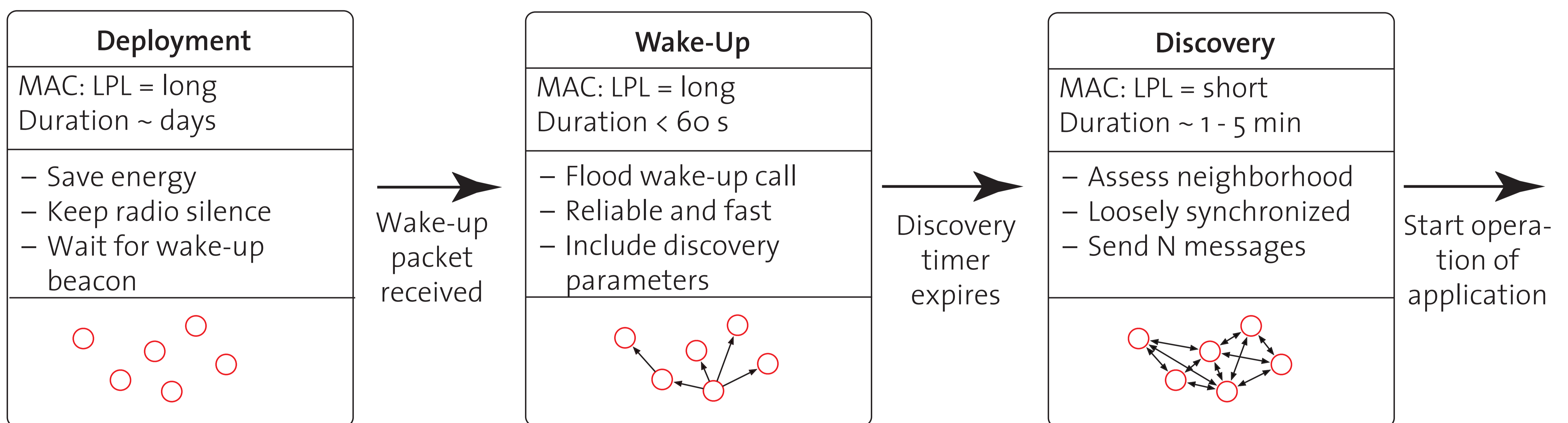


What's the problem:

- Deployment of the node in the network may take days.
- Nodes waste lots of energy while looking for neighbors while they are not yet available.
- Switching to energy savings reduces the responsiveness.
- As soon as all nodes are deployed, the network should be initialized as fast as possible.
- When setting up the network structure, only high quality links should be chosen in order to minimize parent switches.

NoSE provides an energy-efficient and time bound initialization.
NoSE performs an exhaustive neighbor search with a combined link assessment.
NoSE is easily integrated in commonly used protocol stacks (LPL used).

NoSE (Neighbor Search and Link Estimation) Protocol Scheme

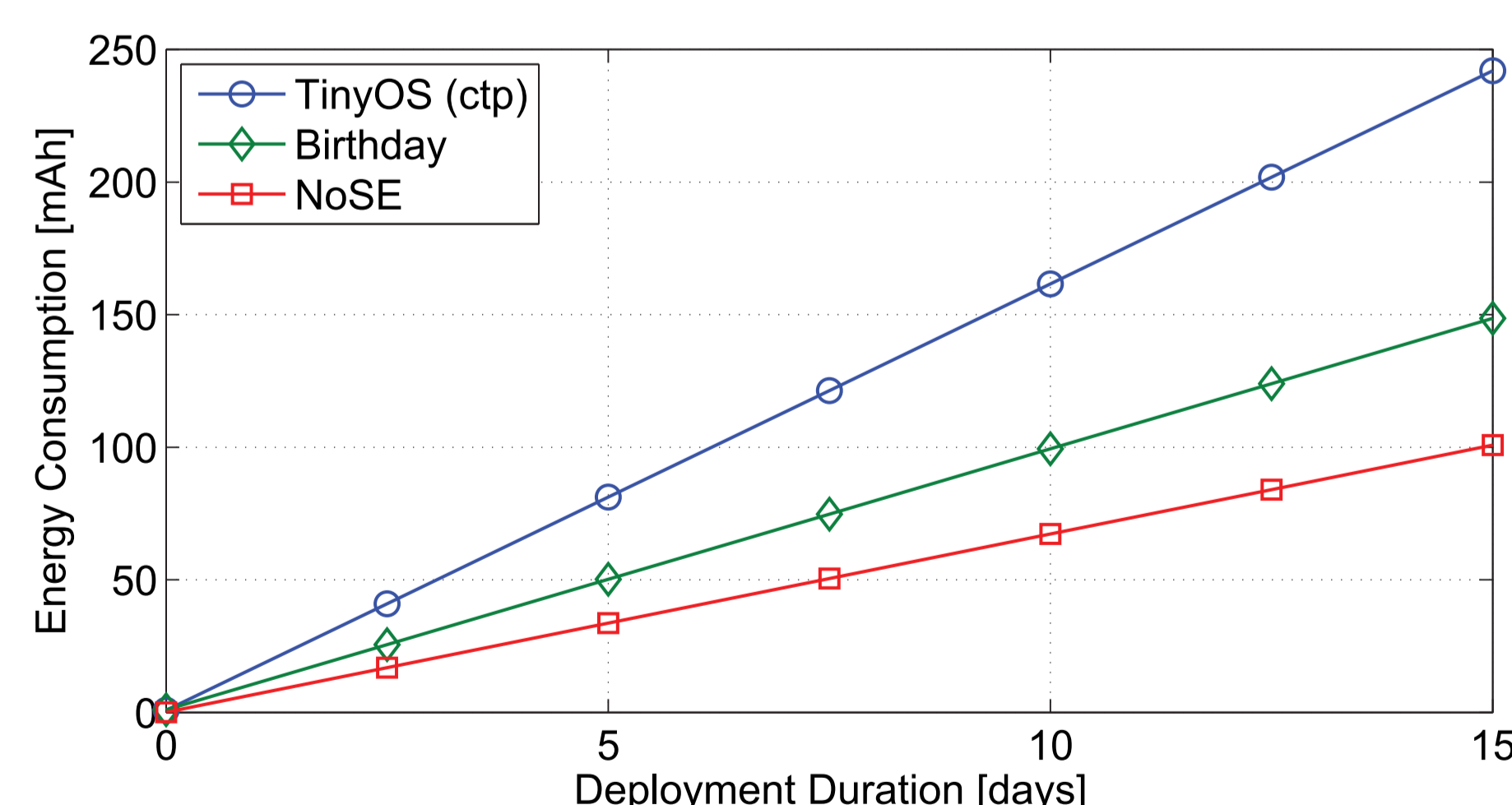


The subsequent operational phase greatly benefits from the well assessed neighbor information: it allows for a fast and robust setup of the topology.

NoSE Evaluation

NoSE Performance:

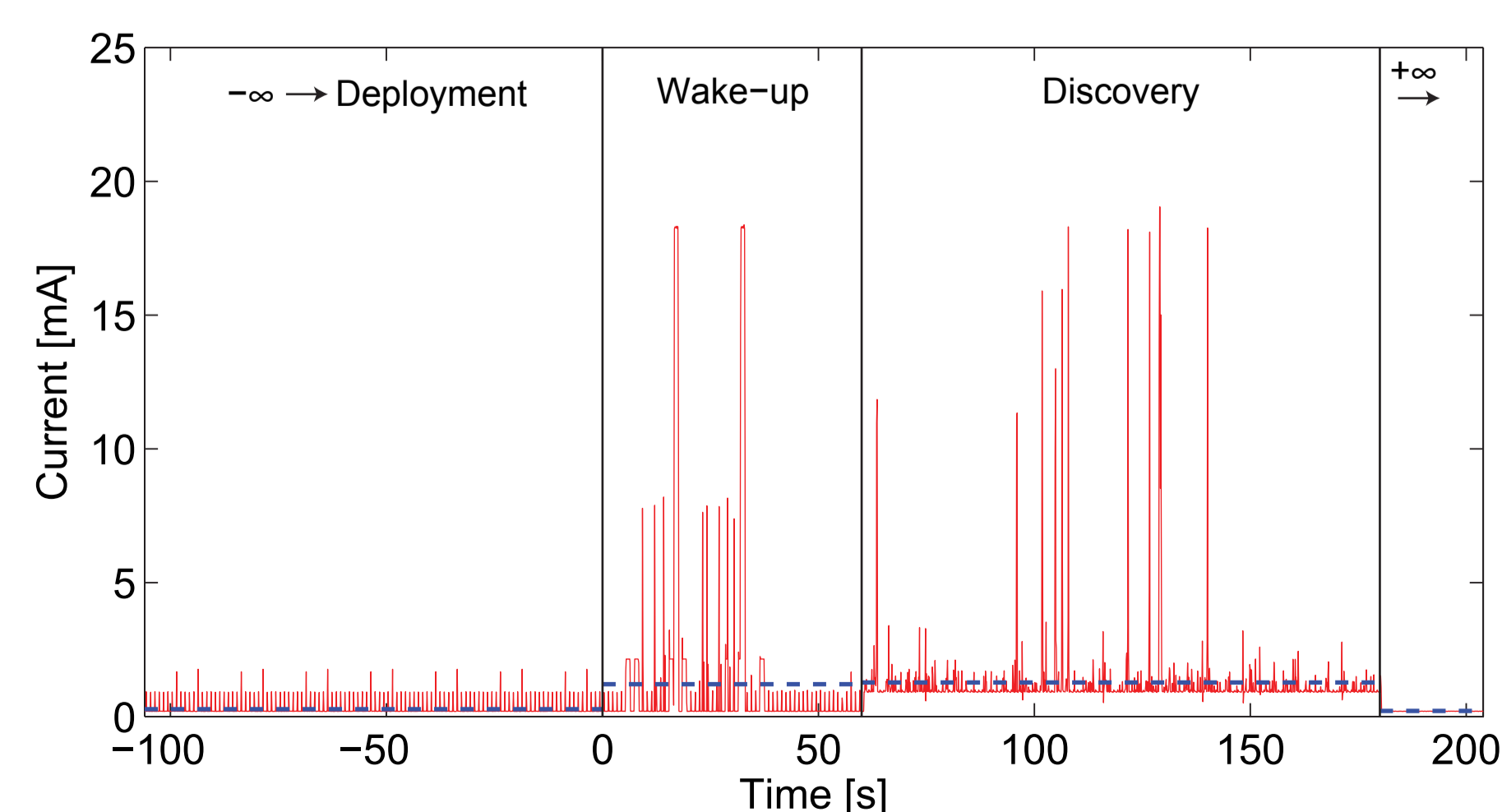
- NoSE greatly minimizes energy consumption during deployment.
- NoSE provides a well assessed neighborhood in 3 min.



Channel Utilization:

- High channel utilization increases chances of collisions.
- Collisions jeopardize link assessment quality.
- Limit channel utilization to 20%.

$$C_U = N(L + 1)T_P^{Disc} / T_D = 10(12 + 1)0.1/60 = 0.2$$



Comparison:

- 60% reduction of energy consumption compared to TinyOS 2.x CTP.
- Birthday protocol is not time bound, does not include link assessment and requires dedicated stack.

