COSC418 Project:
Load balancing in a CTP based network

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Overview

- CTP - Collection Tree Protocol
  - Address-free
  - Best effort delivery
  - Single hop transmissions
  - Designed for low traffic environments
  - Expected transmission (ETX)
  - Each node contains a Link Cost metric.
- CTP LB - Collection Tree Protocol Load Balancing
  - Add load balancing
  - Avoid node hotspots
  - Traffic balancing

Our Design

- $p^* = \arg\min p \in \{\text{ direct neighbours}\} \; [\alpha \cdot (ETX_{s,p} + ETX_p) + \beta \cdot L_p^s]$
- Our design is to keep L_p^s locally
- We increment L_p^s as:
- $L_p^s = n_p^s - t_p^s$
- $n_p^s \geq t_p^s$
- Where t_p^s is incremented periodically through a timer
- t_p^s is included to stop L_p^s getting too large.
- **Why do this instead of transmitting link load data**
- Allows us to use the unmodified CTP routing packet
- Means we can add load balancing to an existing CTP network
- No extra data transmission

Drawbacks

What if $ETX_p + ETX_{p,s} + L_p^s$ (i.e. ETX_s) increases to be $\geq 2^{16}$?

- Bad things...
- This is managed by including the t_p^s in the loading parameter L_p^s
- (Remember $L_p^s = n_p^s - t_p^s$)
- Periodic timer.

Drawbacks

ETX changing with each packet transmission causes routing updates all the time. All these updates would be inefficient.

- A solution to this is to only update routes when ETX changes by a given threshold

Drawbacks

Exponential ETX growth of a node

- In a path of 5 nodes to the root, L_p^s increases with every packet. The more hops to the root, the more pronounced this effect

Conclusion

- No results as yet
- Currently implementing and testing code