

(Experiments with) Property-Based Path Selection

Disclaimer

- **First IETF**
 - Still finding my way around
 - My contributions may be very trivial
- **Involved with the SCION project**
 - May bias my view of things

Looking at the Questions Draft

- Question 2.7 (paraphrased):
 - How can a path aware network reconcile (apparent) conflicts of intent between endpoints and network operators?
- Question 2.8 (paraphrased):
 - How can it be in the interests of network operators to surrender path selection authority to the endpoints?

Doesn't all this directly depend on the specific path selection behaviors of the endpoints?

Requirements for Path Selection Behaviors

- “[an endpoint’s] path selection algorithm should aim to not perform worse than the default case[...]”[1]
- Corollary: *Path selection should not be to the detriment of the network (in the default case)*

[1]: draft-enghardt-panrg-path-properties-02

Categorical Imperative

“Act only according to that maxim whereby you can, at the same time, will that it should become a universal law”



“A path selection behavior still needs to work when a significant number of endpoints use it”

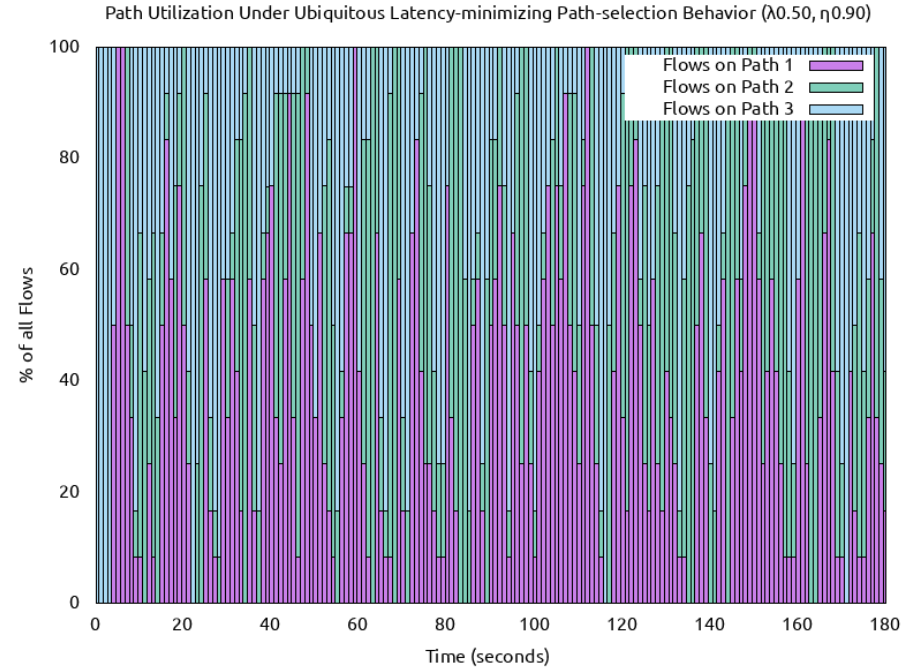
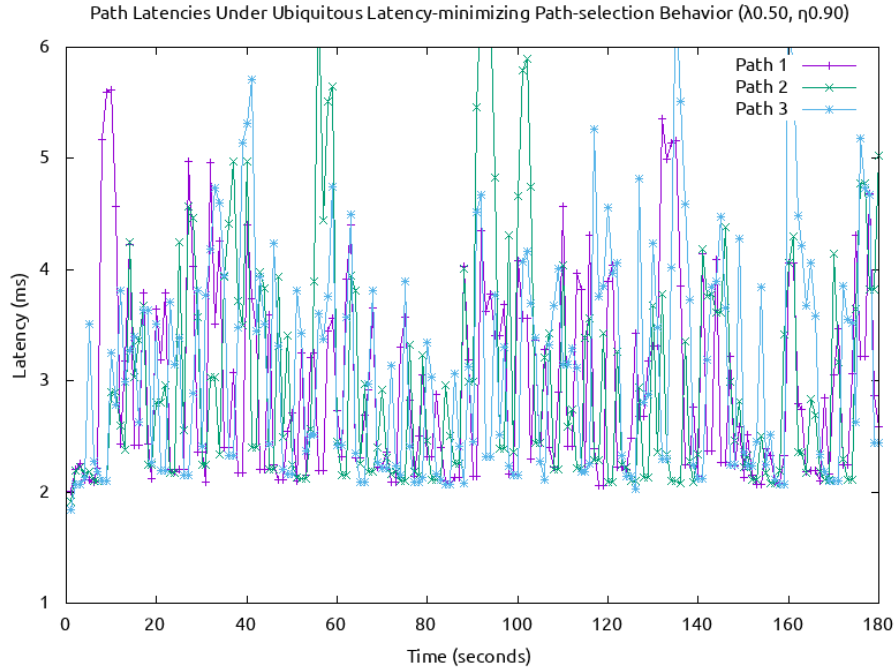
“A path selection behavior must account for the impact its (ubiquitous) use might have on the network”

Example: Flash crowds

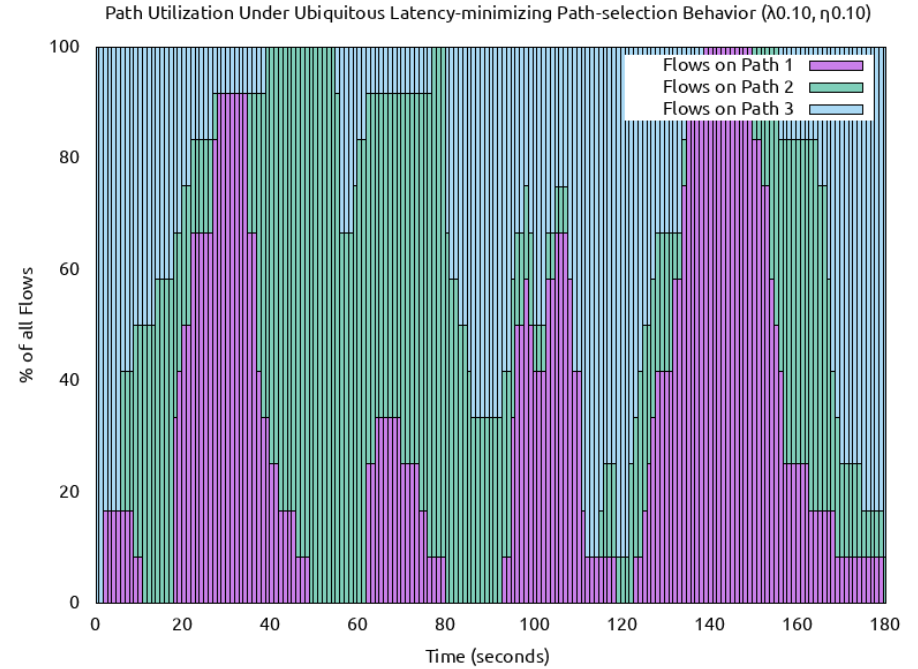
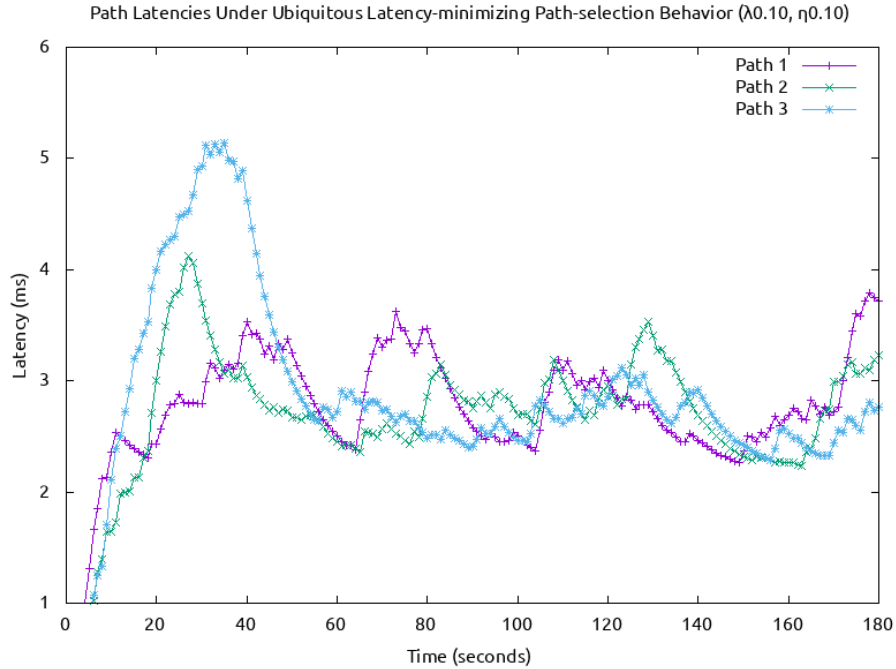
- Latest OS update goes live
 - Millions of bandwidth-maximizing endpoints simultaneously pile onto the paths that promise best throughput
- Worldcup finals
 - Millions of latency-minimizing endpoints want to be able to cheer at the same time as the neighbors

Naive strategies will ~~fall on their faces~~ lead to
wild oscillations

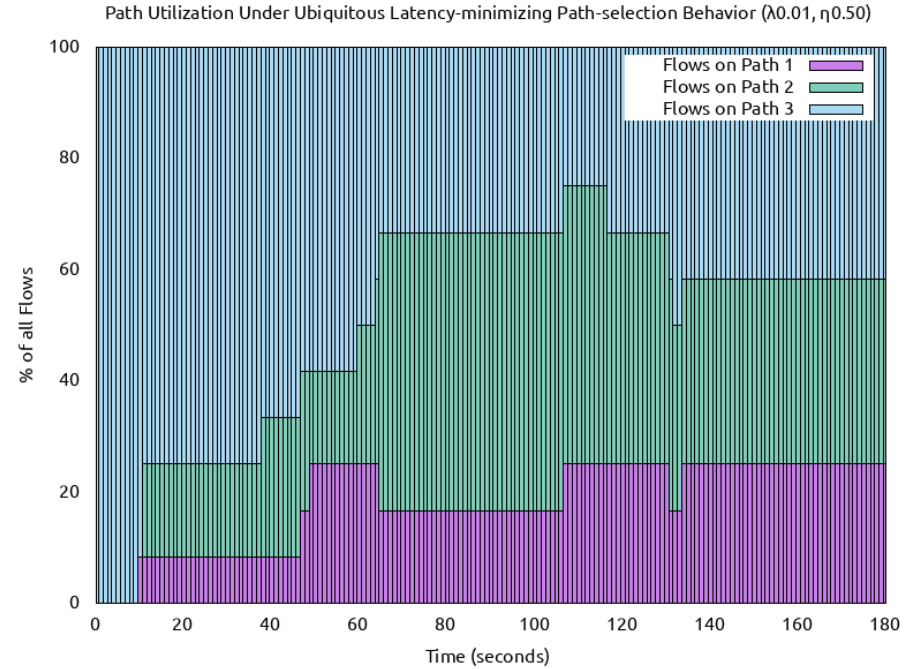
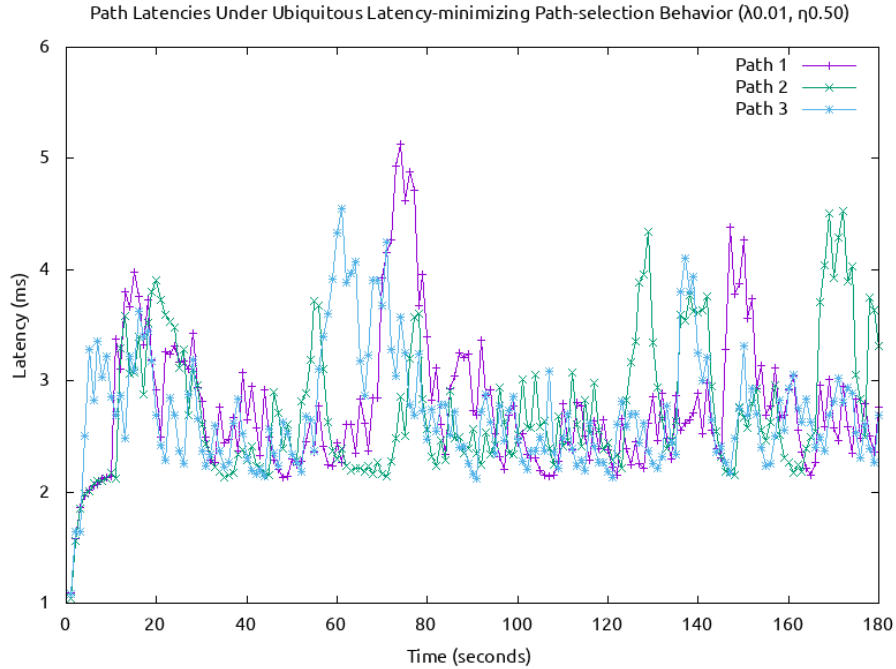
Example



Example



Example



Guidelines for Path Selection Behaviors?

Would it be okay for a network to misrepresent path properties depending on who is asking?

Thank You

Testbed Features

- Path Property Vocabulary
 - *real-time latency/bandwidth/utilization measurements collected on Path*
- Path Property Distribution
 - *pull-based “query” system*
- Path Selection
 - *selecting a Path is equivalent to routing via that Path’s gateway*
- Path Awareness
 - *not exposed to application*
 - *constrained to the current Path-selection algorithm under investigation*