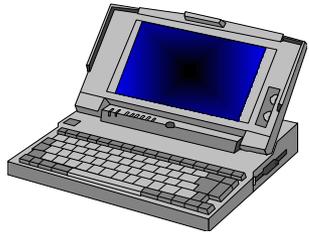




***Mitigating Multimodal
Round Trip Times
(RTTs) in the Internet
of Things***



Jon Crowcroft

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***Work with Carles
Gomez , UPC***

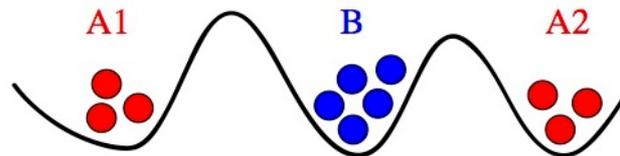


Internet of Things

- Things Sensors, Actuators, Cloud
 - Lots of stuff being connected
 - Sometimes/often battery powered
 - Very low power cpu/memory/network
- Internet & TCP/IP
 - Protocols and code exist
 - Can be subsetted to shrinkwrap above
 - Any actual *differences*?
- Not going to talk about security
 - It is so stupid it is like brexit.

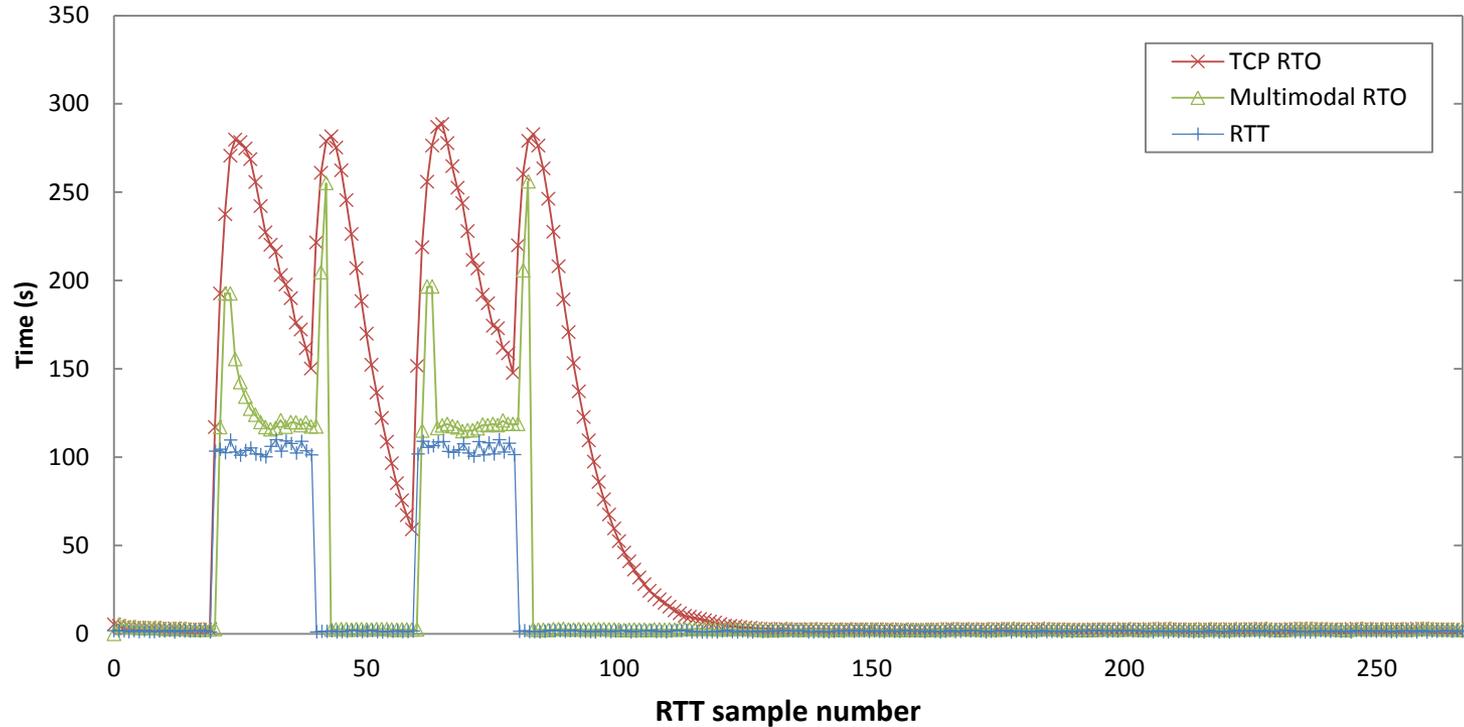
Another scenario

- 2 Byzantine Generals on 2 hills
- Want to attack town
- Send messengers to synchronise
- Messengers can take different time or get captured –to be sure?



Round Trip Times

- RTT and RTO in low power radio nets



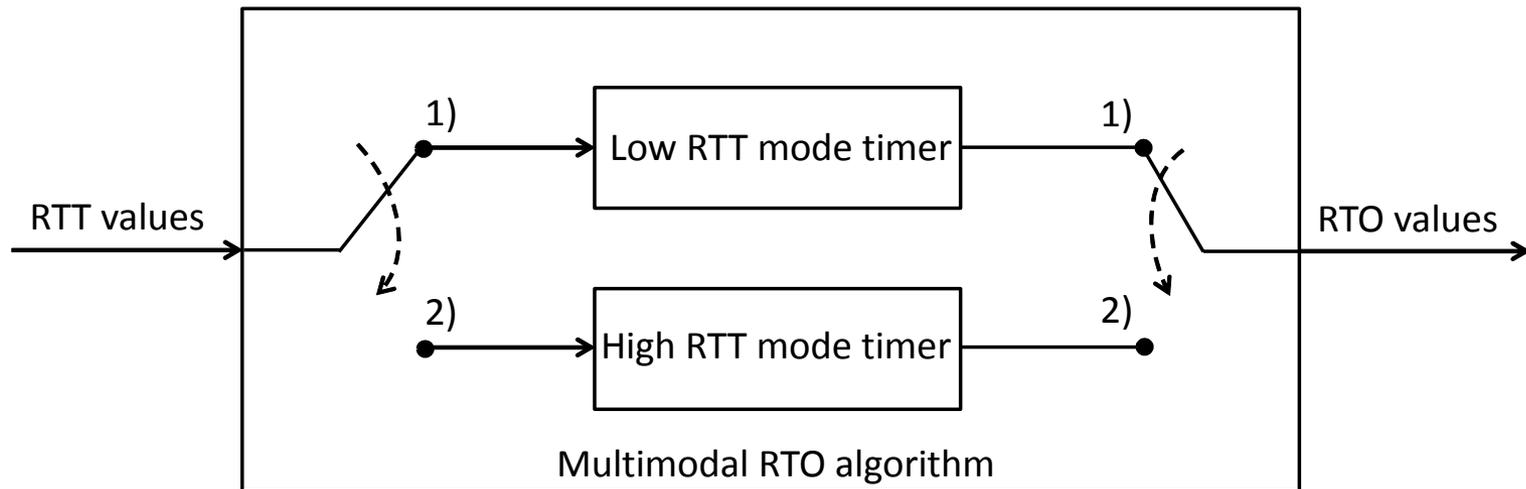
You land on an alien planet

- And observe a bunch of clocks
 - You don't know the intervals they measure (hours(minutes(seconds)))
 - You don't know how many hands?
 - They might be Napoleonic

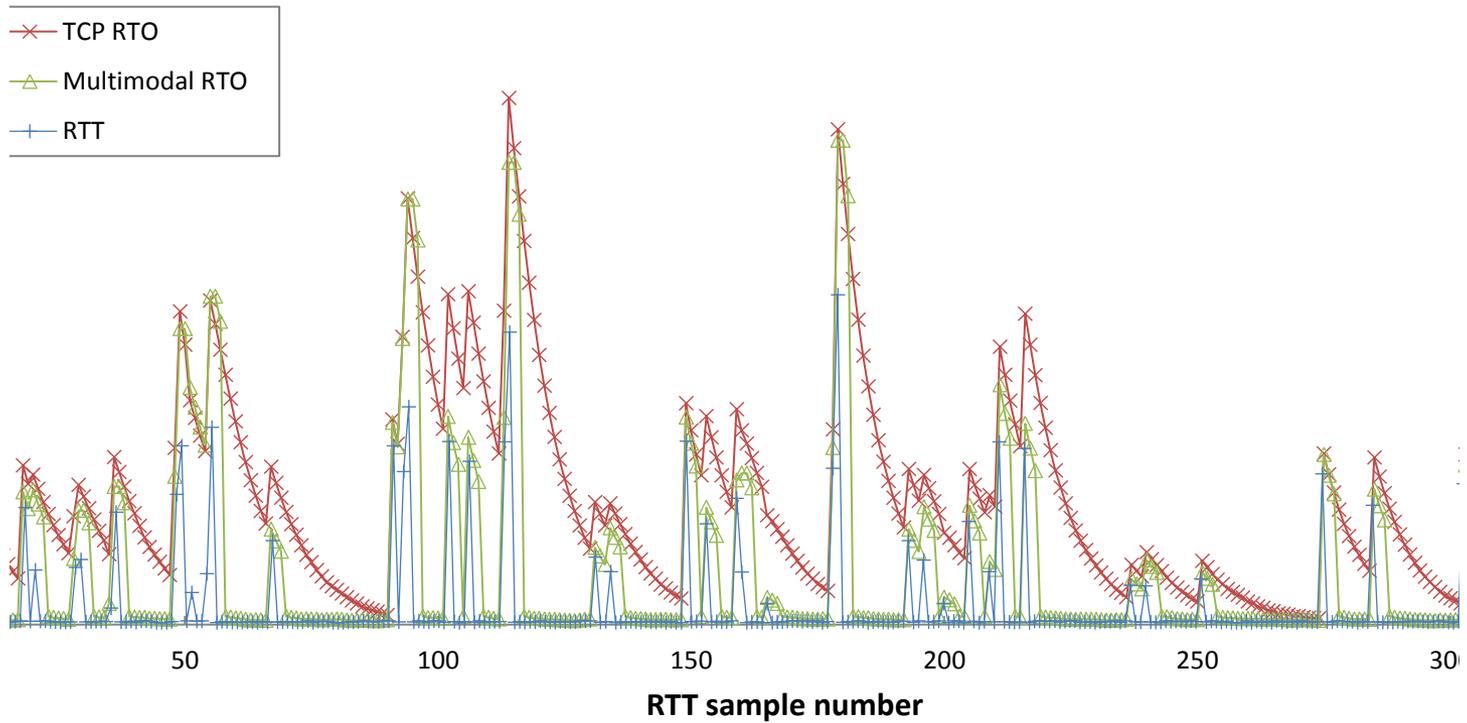


Stats

- Unknown distribution...
- General problem - hard
- How many samples to infer moments?
- What to do with result?
- How about bi-modal?



Seems to work pretty well



Summary

- Interesting problems show up
- In surprisingly mature contexts!
- Practical solutions powerful
- But must ground in principles.

