Approximate Semantics for Wirelessly Networked Applications

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Programming Languages ✅

Compilers ✅

Storage ✅

Arithmetic Units ✅

Communication ❌
802.11 frame header

802.11 frame payload

IP header

IP payload

TCP header

Application data

IP header checksum

TCP checksum

802.11 frame checksum
Frames Retransmitted (%) vs. WiFi Bitrate (Mbps)

12m apart @ UW CSE
< 3% of bits are bad!
Selective Approximate Protocol

- Optional, partial integrity checks
- Suitably generic (can work with “your” apps)
- Backward compatible with existing networks
- Simple API
Selective **Approximate Protocol**

Move error checking to the application layer!
Selective Approximate Protocol

Move error checking to the application layer!

![Diagram showing the move of error checking to the application layer]
Selective Approximate Protocol

Move error checking to the application layer!

![Diagram of network layers](image)
Selective Approximate Protocol

Move error checking to the application layer!
Applications
Open Questions

• Encryption, compression, encoding challenges

• How best to integrate quality metrics?

• How to expose quality controls to apps?
Summary

• **Mismatch** between approximate computing and precise communication

• **Relax** lower-layer integrity checks

• **Improve** throughput & range

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