

Performance and Feature Comparison of Erasure Correcting Coding Software Libraries






Steinwurf

Libraries under Investigation

- Jerasure 1.2 *by James Planck*
- Jerasure 2.0 *by James Planck*
- OpenFEC *by INREA*
- ISA-L *by INTEL*
- KODO *by Steinwurf*

The intention is to make a fair comparison among them and start collaborative research on this topic!

Feature List

Library Capabilities	Kodo	Jerasure 1.2	Jerasure 2.0	ISA-L	Open FEC
Reed-Solomon Codes Supported	X	X	X	X	X
Network Coding Supported	X				
Updated with Novel Code Structures	X				(X)
Continuous Testing and Support	X				
Continuous Optimization of Algorithms	X				
Automatic Adaptation to CPU Features	X				
OS Support				FreeBSD 	
Compiler Support	GCC, Clang, MS VS	?	GCC	GCC	?
Date of Last Release	1/2014	8/2008 12/2011 ^x	1/2014	11/2013	4/2012
Hardware Acceleration on Intel Chipsets	SSSE3 AVX2		SSSE3, CLMUL	SSSE3, CLMUL	SSE
Hardware Acceleration on ARM chipsets	NEON				
Multi-core support	X				

Coding Speed for 1 kB per packet

$F=2^8$ $P=1\text{kB}$	Kodo (sparse)	Kodo (full)	Jerasure 1.2	OpenFEC
G=16				
G=128				
G=1024				

$F=2^8$ $P=1\text{kB}$	Kodo (sparse)	Kodo (full)	Jerasure 2.0	ISA-L
G=16				
G=128				
G=1024				

Coding Speed for 1 MB per packet

F=2⁸ P=1MB	Kodo (sparse)	Kodo (full)	Jerasure 1.2	OpenFEC
G=16				156/147
G=128				
G=1024				

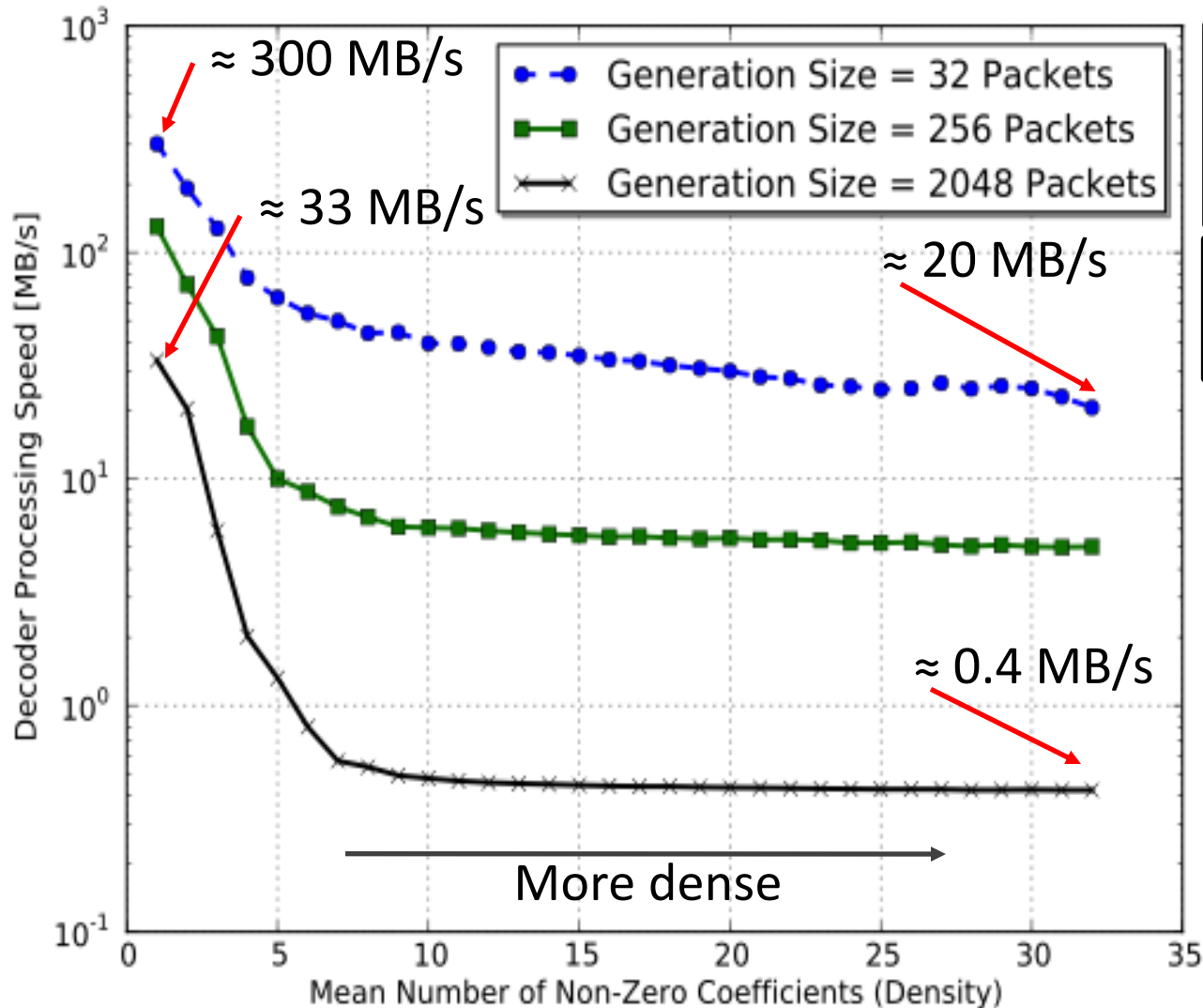
F=2⁸ P=1MB	Kodo (sparse)	Kodo (full)	Jerasure 2.0	ISA-L
G=16		582/561	641/649	1025/1224
G=128				
G=1024				

Request for Collaborative Testing

- IRTF could be a nice ground to do collaborative testing
- What is the metric ?
 - Coding speed
 - CPU
 - Memory

SPARSE CODES

Sparse Network Codes



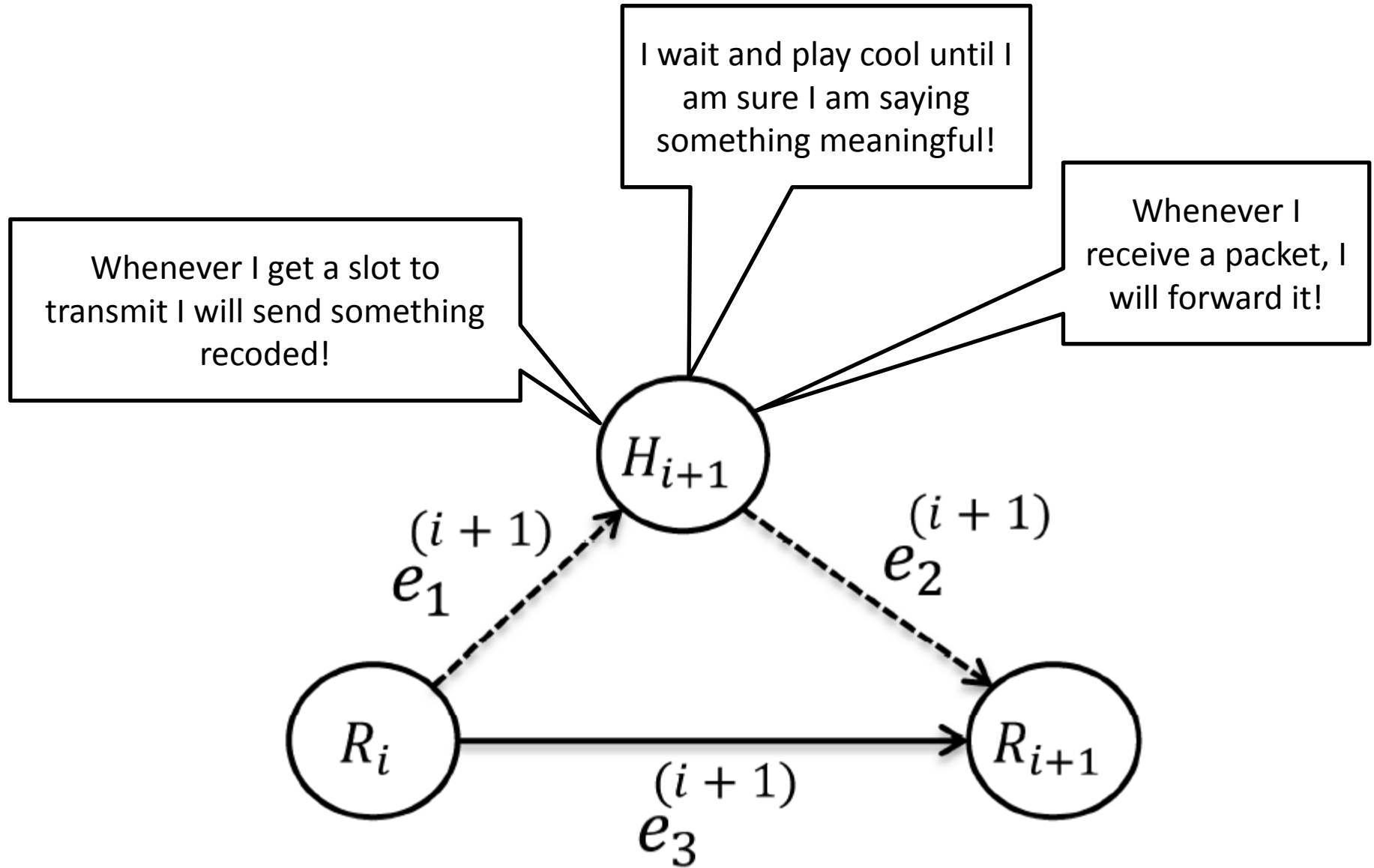
One or two orders of magnitude in the coding speed by sparsity.

Dualism Theory and Implementation!

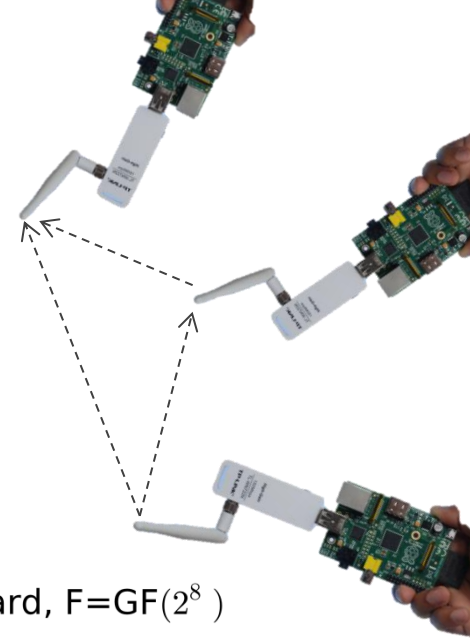
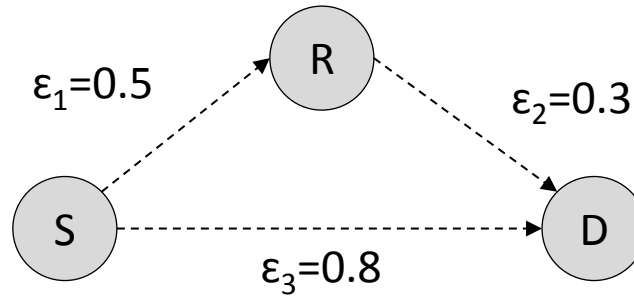


RECODING

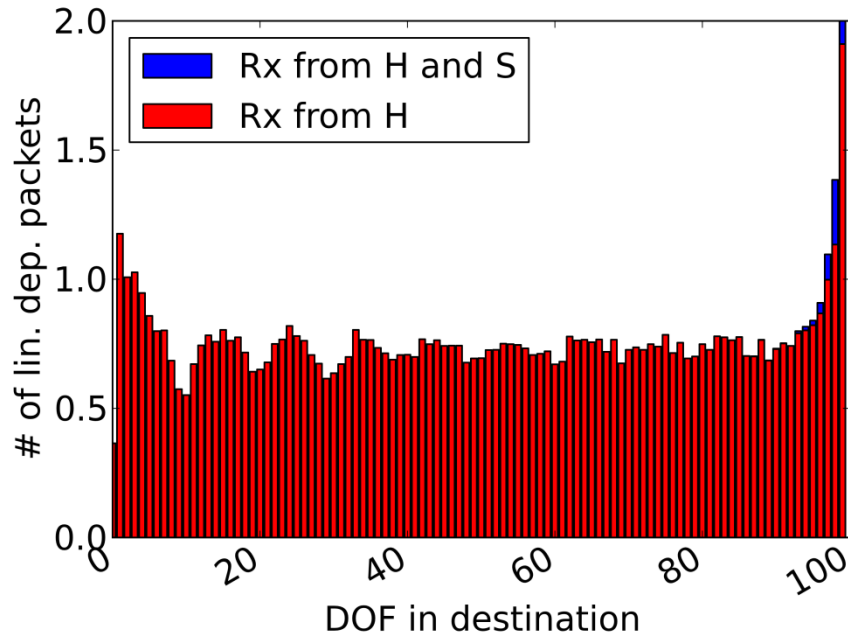
Strategies under Investigation



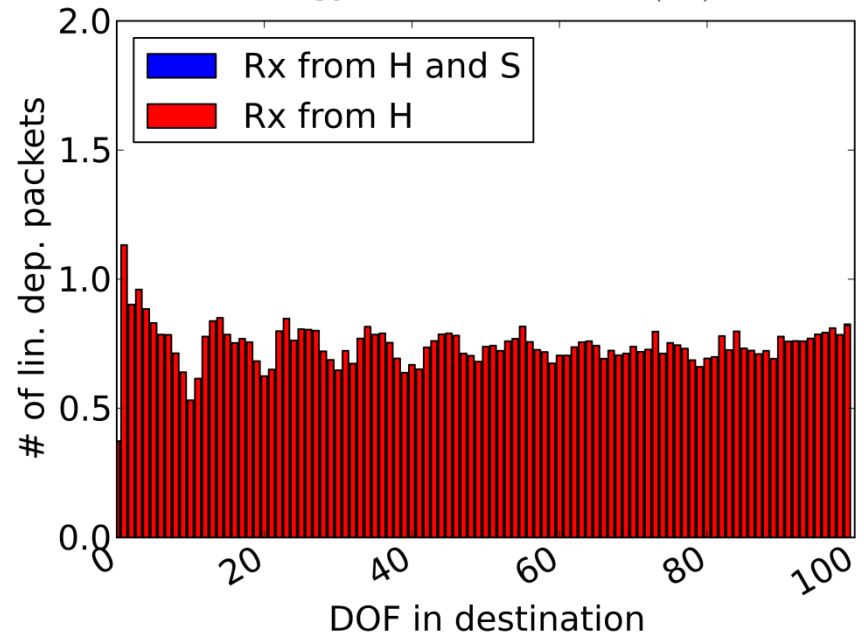
Store and Forward



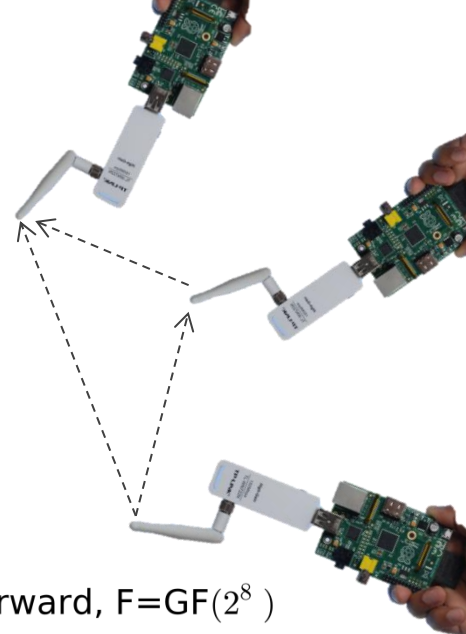
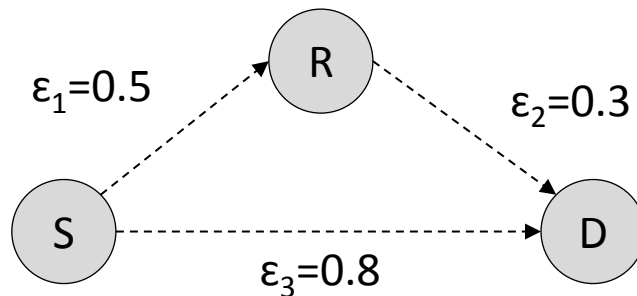
strategy=standard, $F=GF(2)$



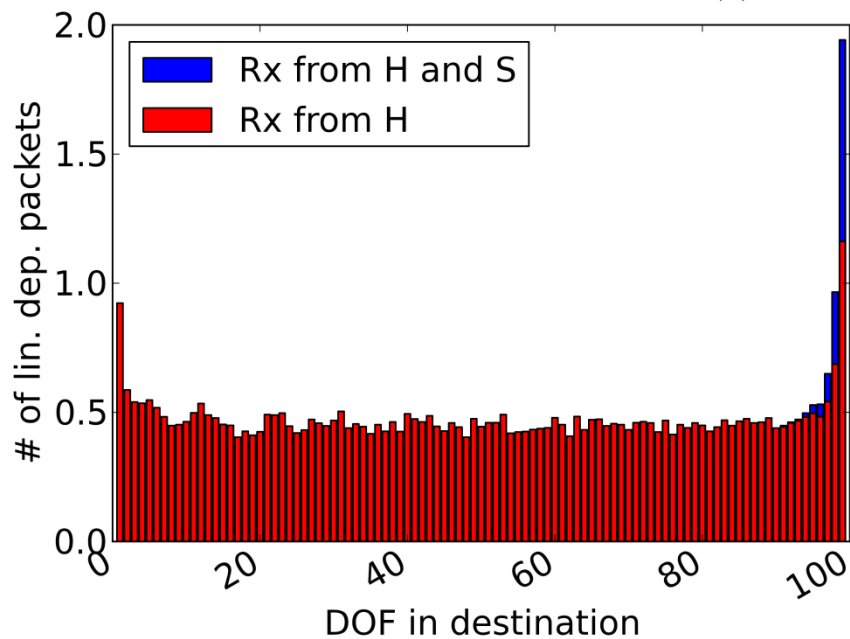
strategy=standard, $F=GF(2^8)$



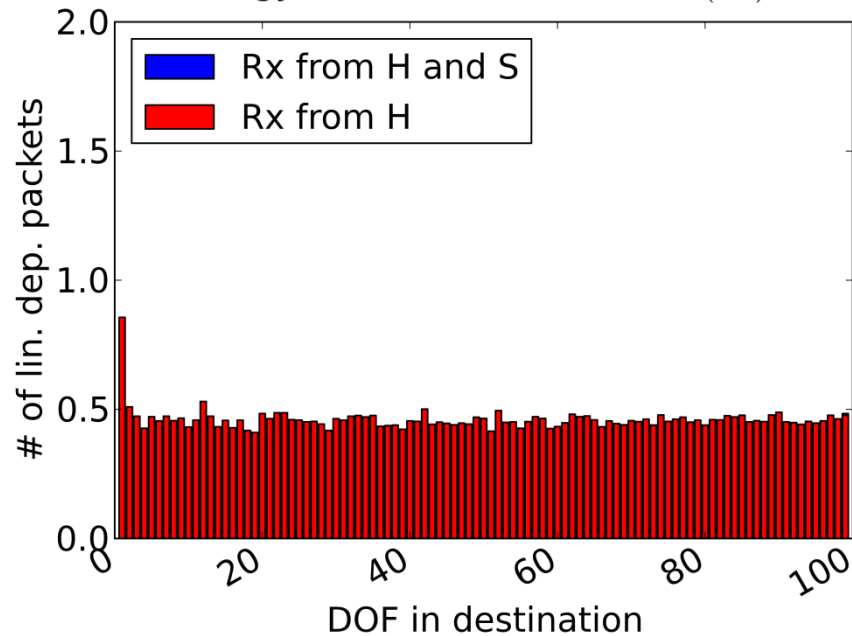
Recode



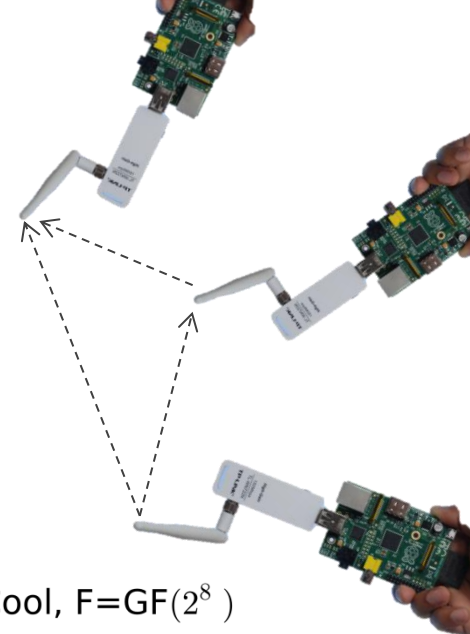
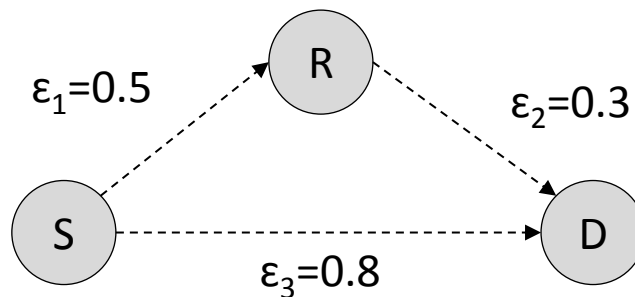
strategy=recode-forward, $F=GF(2)$



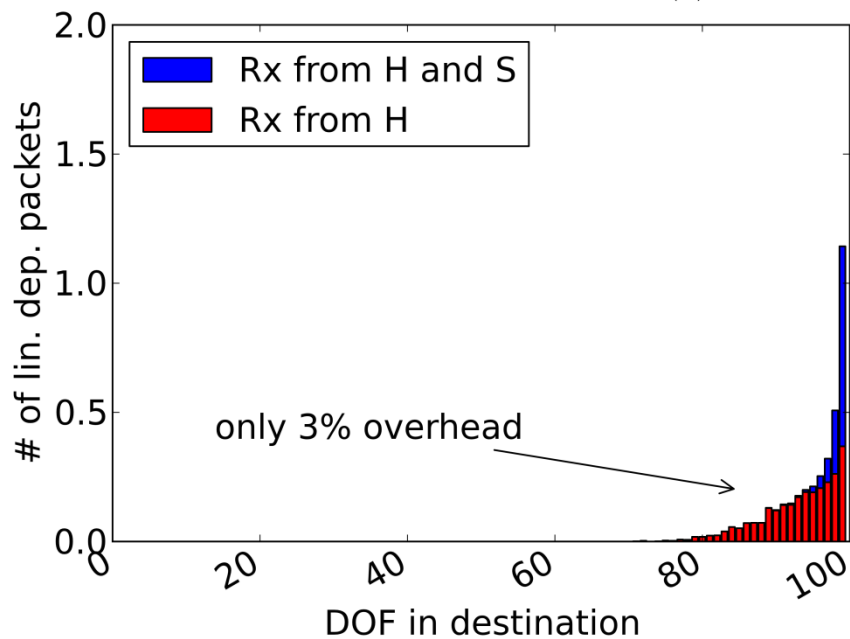
strategy=recode-forward, $F=GF(2^8)$



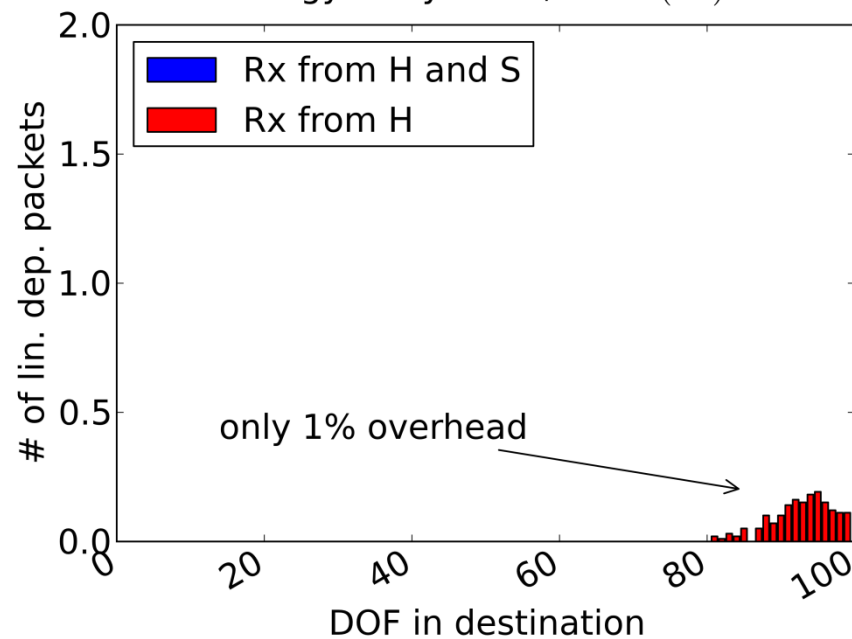
PlayNCool GF(2)



strategy=PlayNCool, F=GF(2)



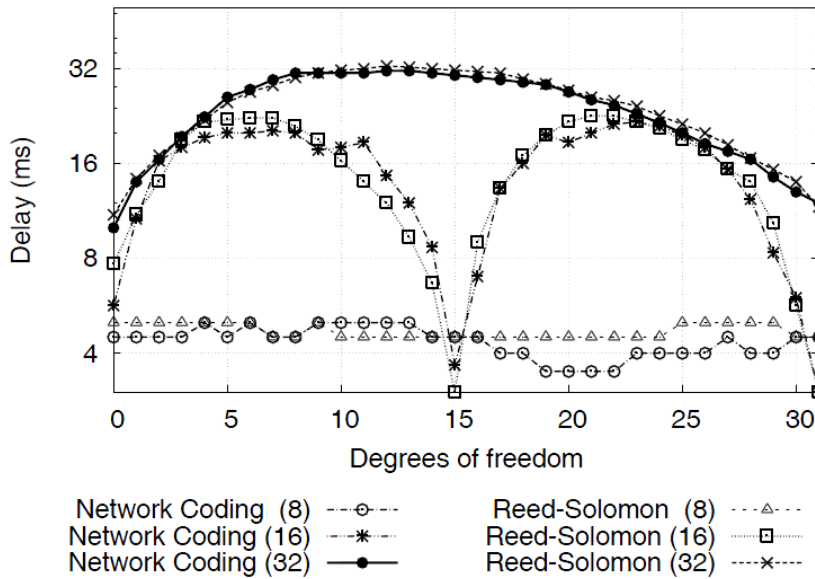
strategy=PlayNCool, F=GF(2⁸)



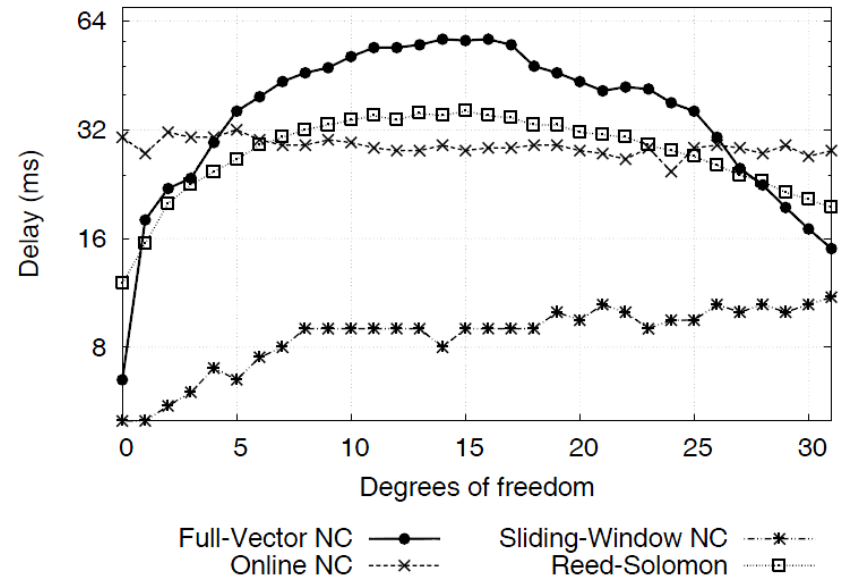
ON THE FLY CODING & SLIDING WINDOW

Delay in point to point

With static redundancy



With dynamic redundancy



Potential for IETF/IRTF

- Research per se on the network coding topic
- RFC about protocol design
 - For coding zone
 - Framing