

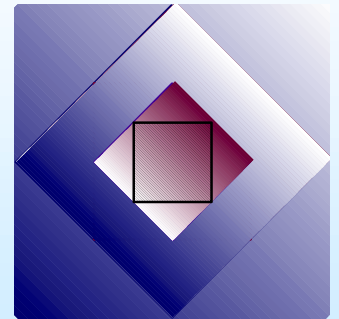
iSCSI – a SCSI over TCP mapping

IETF - 50



Julian Satran

IBM Research Lab in Haifa





Items to discuss

- ◆ CRC32, 64 and other checksums
 - ◆ What should be our requirements
 - ◆ Summary of findings
- ◆ Security
 - ◆ Separate presentation
- ◆ Formats
 - ◆ Several alternatives
- ◆ Recovery
 - ◆ What we will attempt to do



Checksum/CRC requirements

- ◆ Protect against:
 - ◆ Protect against sporadic errors (low noise channels – independent single bit errors)
 - ◆ Protect against burst errors (as software and unprotected components can introduce this type of error too)
 - ◆ Protect when data is not uniformly distributed (biased as most real data is)
 - ◆ Probability of undetected errors in excess of 10^{-25} (ideally in excess of 10^{-50}) for a decent block length



CRC vs. Checksum - performance

	Checksum	CRC32C
distance	3	4
block (bits)	2^{19}	$2^{31}-1$
Pudb/8kblock	10^{-36}	10^{-41}
Puds/8kblock	10^{-35}	10^{-40}
Data Bias sensitivity	high	low



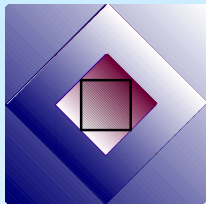
CRC vs. Checksum - complexity

	Checksum	CRC32C
Hardware	Adder or Adder+Modulo	LFSR
Instructions/byte	2/3	2.75
Table lookups	-	0.5 byte
Table-size	-	2 ¹⁸ bytes



Checksum/CRC survey

- ◆ Results will be presented in a forthcoming memo (ID)
- ◆ Recommend – CRC32C as mandatory to implement. Good for all block lengths up to $2^{31}-1$ bits
- ◆ CRC32C is:11EDC6F41
- ◆ CRC32Q is:1814141AB



Formats

- ◆ Format alternatives
 - ◆ Single Header Digest Formats
 - ◆ Multiple Header Digest Formats
- ◆ Format illustration/documentation
 - ◆ Eliminate common parts
 - ◆ Always complete



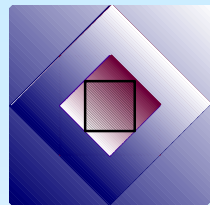
Single digest

QL	Length of AHSs or Data Length
BHS	
Type	Data Length-optional
Type	AHS fields-optional
Type	AHS fields-optional
Digest (if any)	



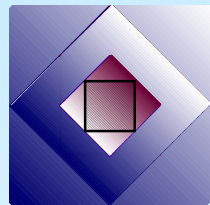
Single digest

- ◆ QL (Qualified Length) coding:
 - ◆ B7-0 No AHS, 1 – AHS
 - ◆ B6-4 Reserved
 - ◆ B3-0 Parity for first 4 bytes (or ECC)
- ◆ Type coding
 - ◆ Bit 7-4 AHS Type
 - ◆ 0-data
 - ◆ 1-Bidi
 - ◆ 2-Extended CDB
 - ◆ Bit 3-0 Parity for first 4 bytes (or ECC)
 - ◆ Length not needed always (fixed length AHS)



Multiple digests

QL	Length
BHS	
Digest1	
Type=DL	Data Length
Type	AHS fields
Type	AHS fields
Digest2	



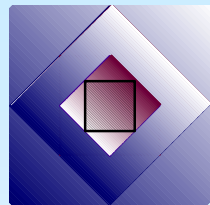
Multiple digests – Barry Reinhold and Robert Russell

Alength	Dlength
BHS	
Digest1	
Type	Length+Fields
Type	Length+Fields
Digest2	



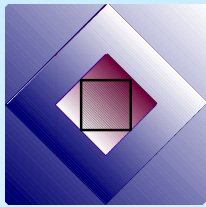
Format illustration choices

- ◆ Complete headers (as in pre 04 – including all BHS fields and length)
- ◆ Headers without length (as in in 05)
- ◆ Headers with length but in another position?
- ◆ Other formats



Recovery

- ◆ A pseudo-language description of recovery will be added
- ◆ A team is working now on it:
 - ◆ Mallikarjun C., Somesh Gupta, Steph Bailey, John Hufferd, Luciano Dalle Ore, Venkat Rangan, Julian Satran
- ◆ No recovery is mandatory
- ◆ No need to use length that is in doubt
- ◆ DataSN is there to ensure sequence.
Recovery is optional



off the mark

by Mark Parisi

www.offthemark.com



03/19/20