ECC Algorithm
(512Byte)

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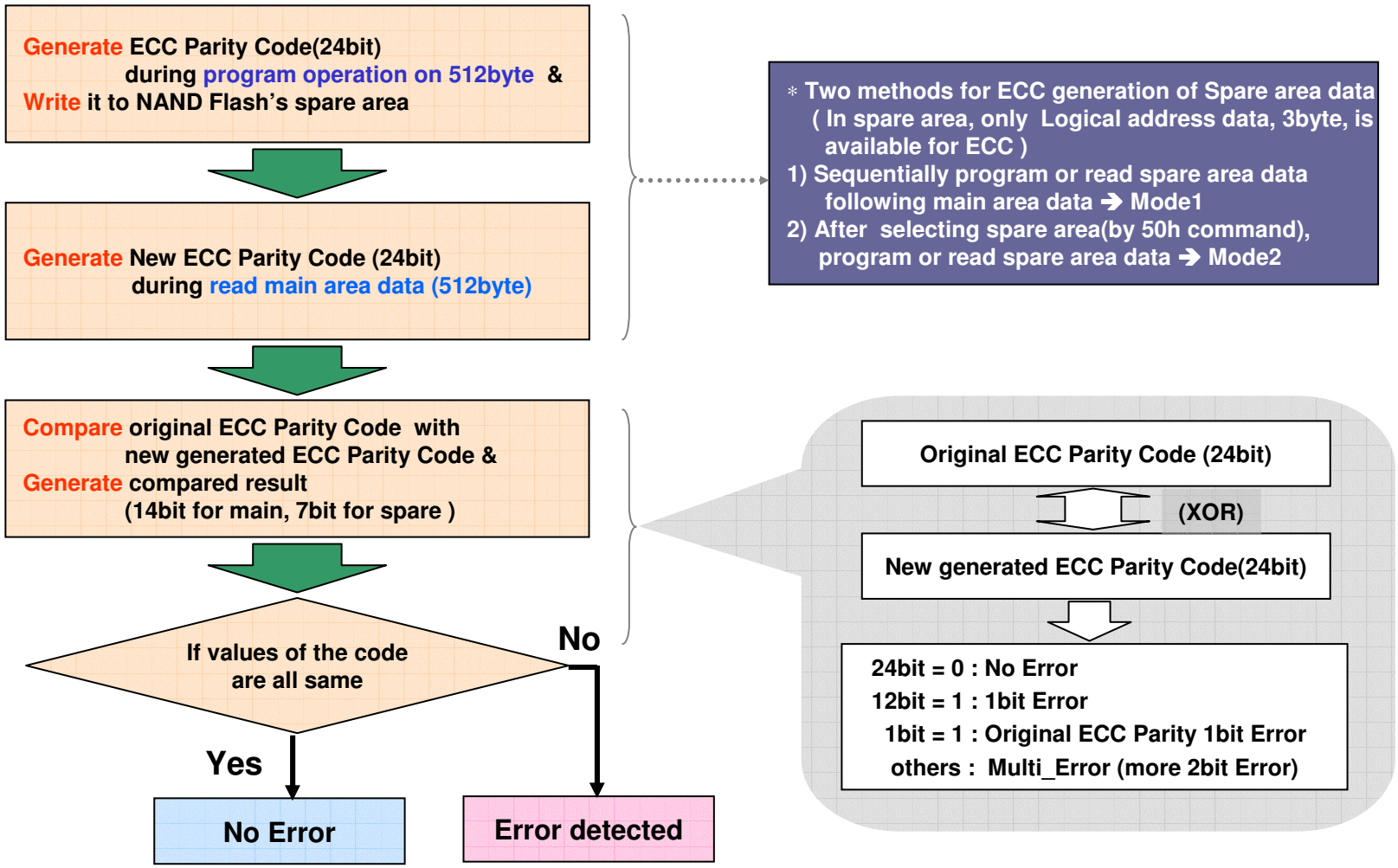
This is only example algorithm for SW ECC.
In case of OneNAND which supports HW ECC, parity bit position can be changed.

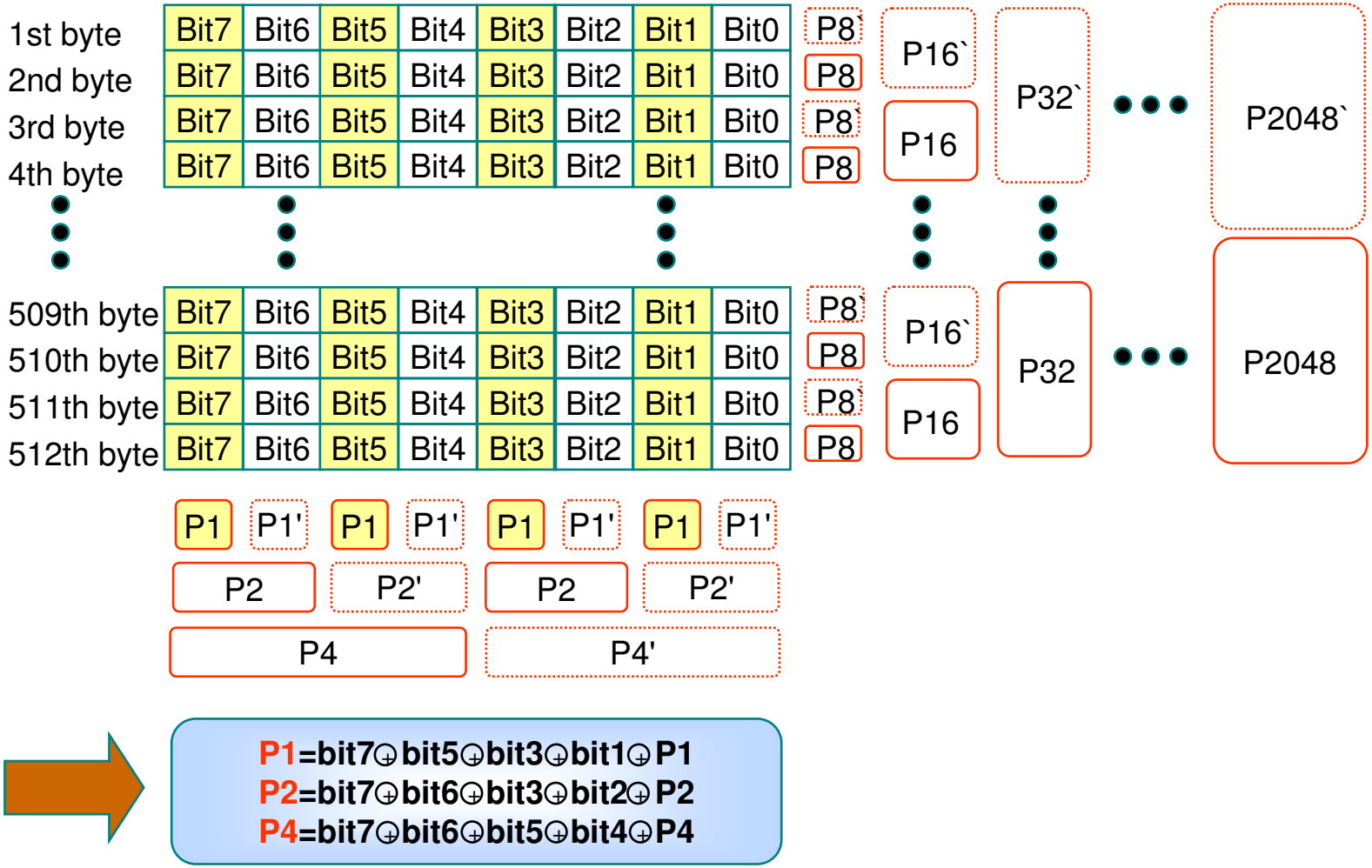
Processing Procedure

For 512Byte



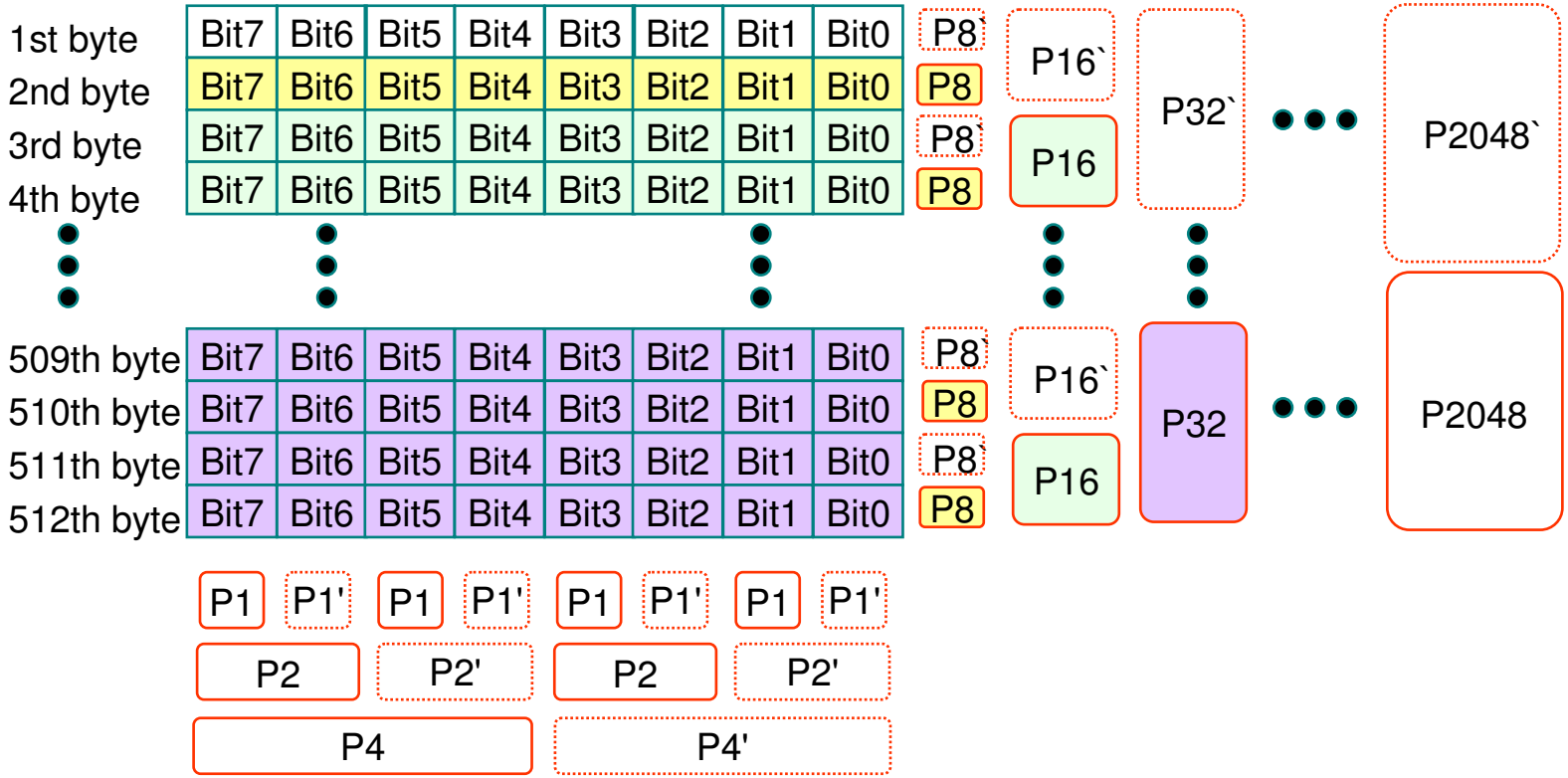
Parity Generation for Main Array (Column)

For 512Byte



Parity Generation for Main Array (Row)

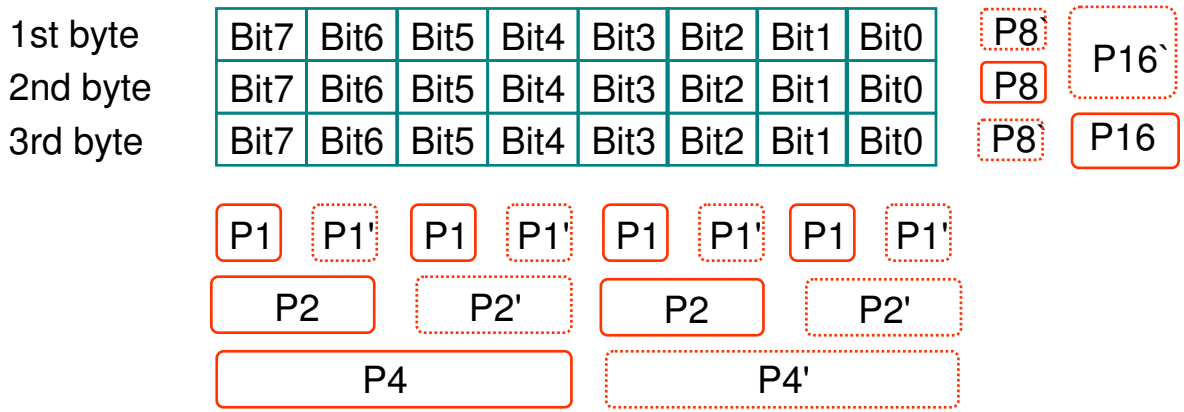
For 512Byte



P8= bit7⊕bit6⊕bit5⊕bit4⊕bit3⊕bit2⊕bit1⊕bit0⊕P8

Parity Generation for Spare Array (Logical Address)

For 512Byte



P1_s=bit7⊕bit5⊕bit3⊕bit1⊕P1
P2_s=bit7⊕bit6⊕bit3⊕bit2⊕P2
P4_s=bit7⊕bit6⊕bit5⊕bit4⊕P4
P8_s = bit7⊕bit6⊕bit5⊕bit4⊕bit3 ⊕bit2 ⊕bit1 ⊕bit0 ⊕P8

ECC CODE FORMAT STANDARD

For 512Byte

■ X8 org. NAND Flash

- **ECC Code for Main area data**

P1~P4 : Column Parity , P8~P2048 : Row Parity

	I/O7	I/O6	I/O5	I/O4	I/O3	I/O2	I/O1	I/O0
ECC0	~P64	~P64'	~P32	~P32'	~P16	~P16'	~P8	~P8'
ECC1	~P1024	~P1024'	~P512	~P512'	~P256	~P256'	~P128	~P128'
ECC2	~P4	~P4'	~P2	~P2'	~P1	~P1'	~P2048	~P2048'

- **ECC Code for LSN data**

P1_s: Column Parity , P2_s~P16_s : Row Parity

	I/O7	I/O6	I/O5	I/O4	I/O3	I/O2	I/O1	I/O0
S_ECC0	~P2_s	~P2'_s	~P1_s	~P1'_s	~P16_s	~P16'_s	~P8_s	~P8'_s
S_ECC1	1	1	1	1	1	1	~P4_s	~P4'_s

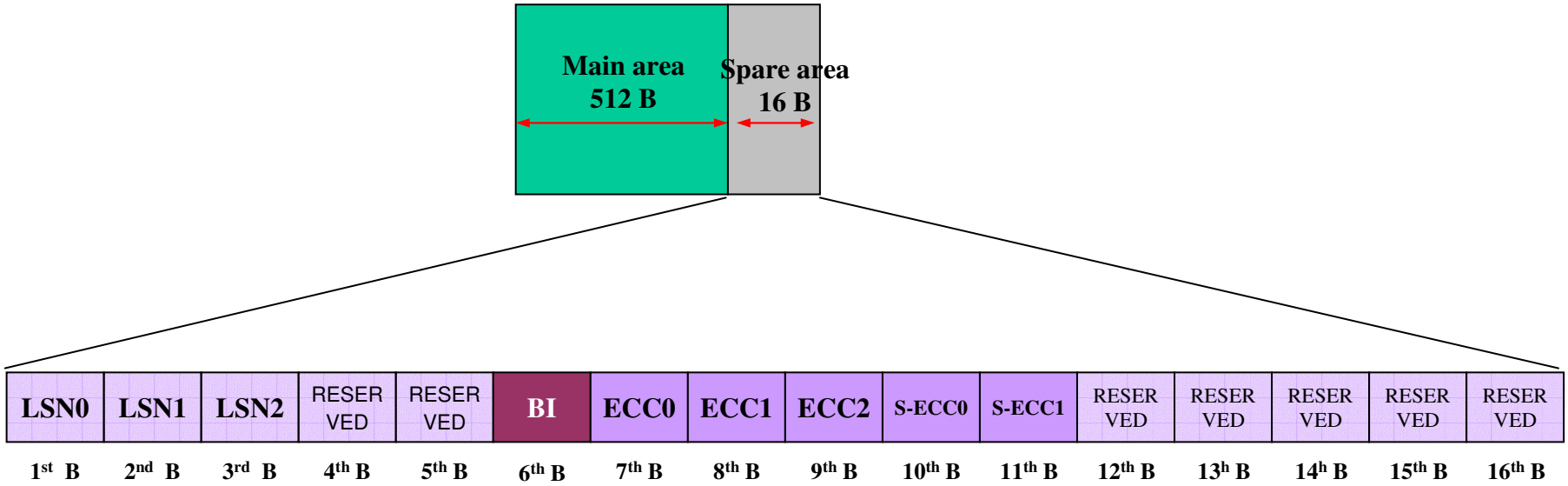
* ~ : Logically Inverse operation

SPARE AREA ASSIGNMENT STANDARD

For 512Byte

■ *Small Page(528B) & X8 org. NAND Flash*

- Device : 64Mb, 128Mb, 256Mb, 512Mb, 1Gb DDP



> LSN : Logical Sector Number
> ECC0,ECC1,ECC2 : ECC code for Main area data
> S_ECC0,S_ECC1 : ECC code for LSN data
> BI : Bad block Information

Compare Result Table

For 512Byte

- **For Main Array 512byte**

  Stored ECC(in Spare area) [P2048P2048'P1024P1024'…P2P2'P1P1']
  ⊕ Computed data's ECC result [P2048P2048'P1024P1024'…P2P2'P1P1']

	No Error	1bit Error	ECC Parity 1bit Error	Multi_Error
XORed Results	24 bits : 0	12 bits : 1	1 bit : 1	Others

error position is
P2048P1024P512…P4P2P1

- **For Spare Array 3byte**

  Stored ECC(in Spare area) [P16P16'P8P8'P4P4'P2P2'P1P1']
  ⊕ Computed LSN's ECC result [P16P16'P8P8'P4P4'P2P2'P1P1']

	No Error	1bit Error	ECC Parity 1bit Error	Multi_Error
XORed Results	10 bits : 0	5 bits : 1	1 bit : 1	Others

error position is
P16P8P4P2P1