

# DICOM Implementation Experience at ITC

Advanced Technology Consortium  
for Clinical Trials Quality Assurance

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# Some Problems Encountered

- Inconsistent precision used in different IODs within the same file set
- “Grid Frame Offset Vector” not used consistently by different vendors
- 32 bit dose packing

# Inconsistent Precision Used

- Causes Z values for CT and SS to not be equal
- ITC forces the SS Z value to equal the Z value of the nearest CT

# Frame Offset Vector

- Per DICOM standard the values in “Grid Frame Offset Vector” in RT Dose IOD should be “z coordinates (in mm)”
- Most vendors interpret that as absolute position in patient space
- One vendor interpreted the vector as relative positions in patient space with the absolute position determined by “Image Position (Patient)”

# Hypothetical 24 Bit Pixel Cell

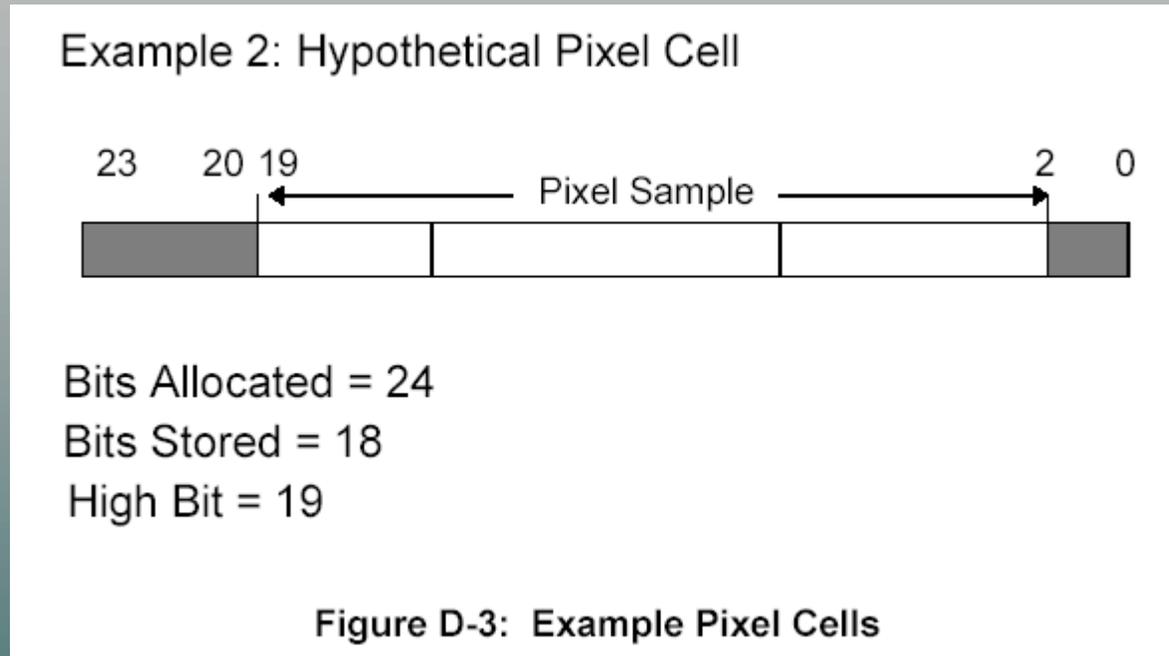


Figure From PS 3.5 - 2003



# 24 Bit OW Layout in Memory

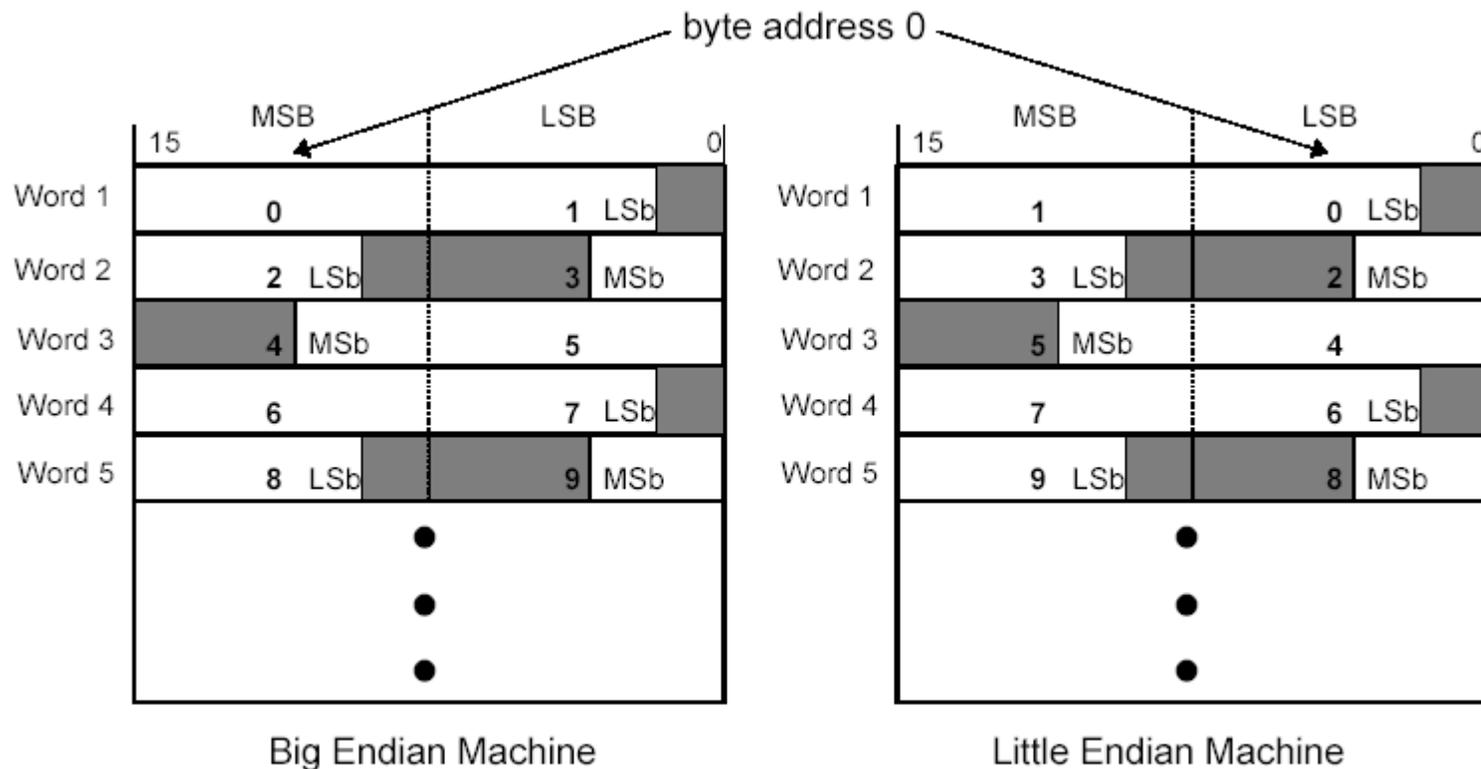
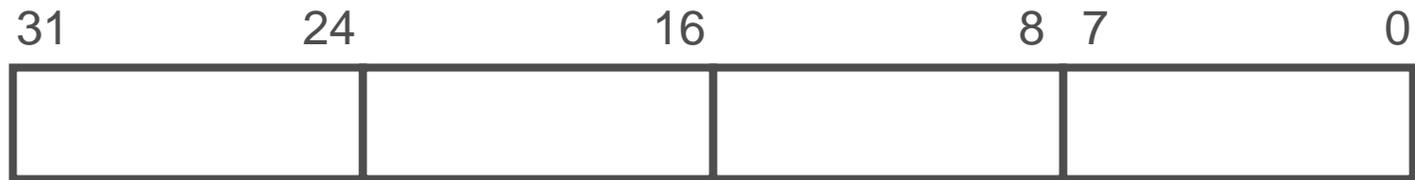


Figure D-5: Example Pixel Cells Byte Ordered in Memory (VR = OW)

## Figure From PS 3.5 - 2003

# 32 Bit Pixel Cell



Bits Allocated = 32

Bits Stored = 32

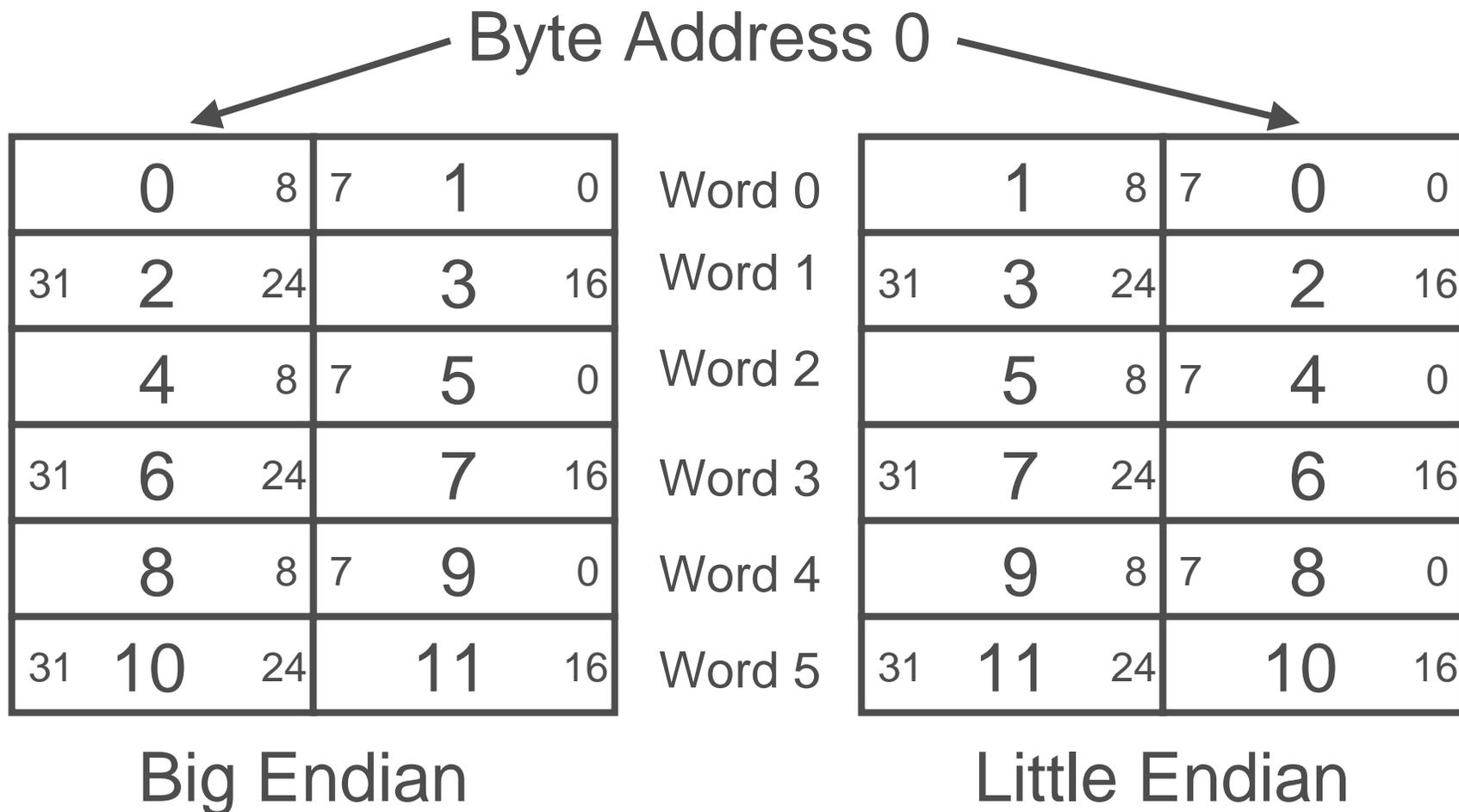
High Bit = 31

# 32 Bit Pixel Cell Data Packing

	8	7	0	Word 0
31	24		16	Word 1
	8	7	0	Word 2
31	24		16	Word 3
	8	7	0	Word 4
31	24		16	Word 5

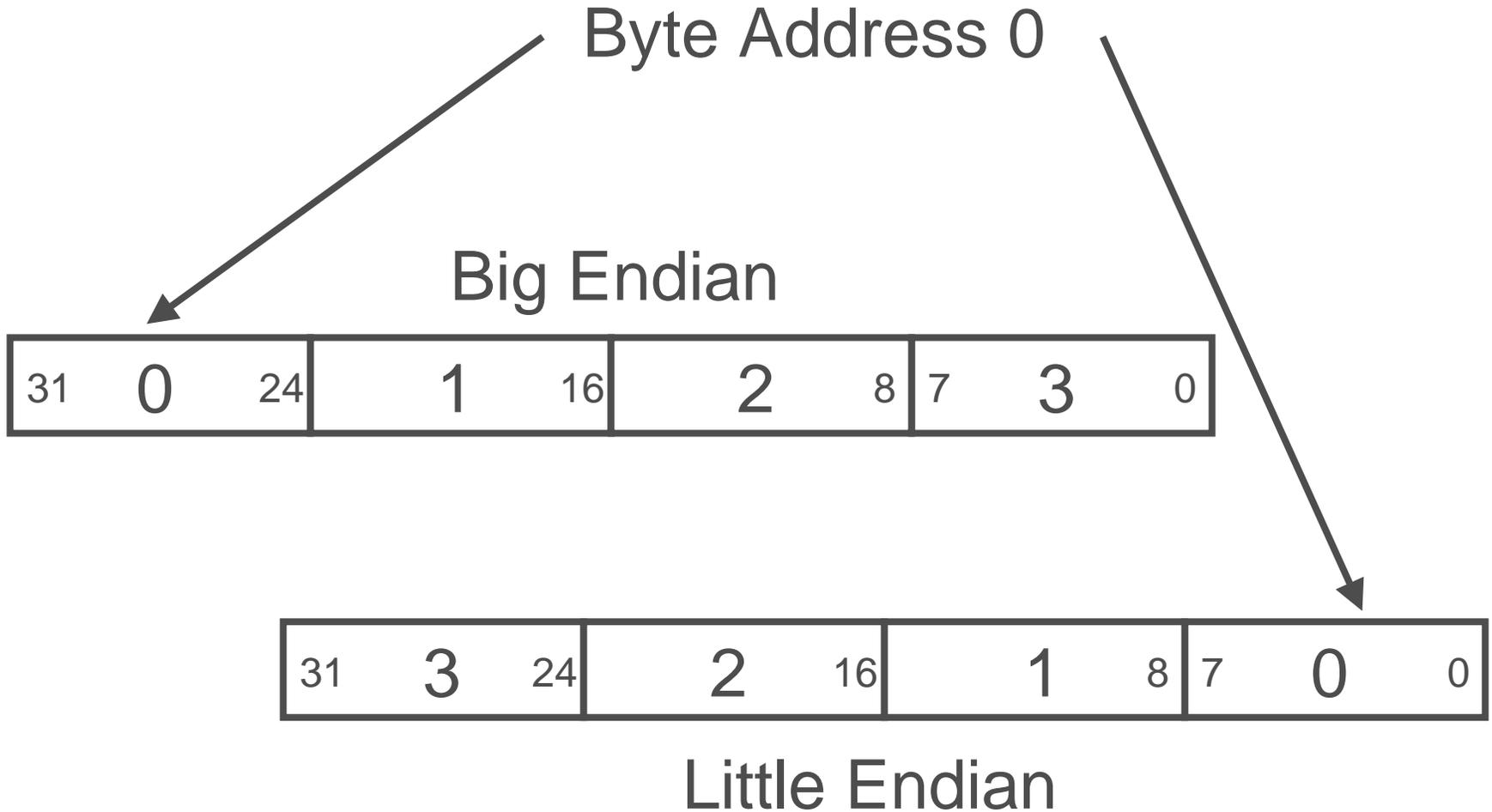
VR = OW

# 32 Bit OW Layout in Memory

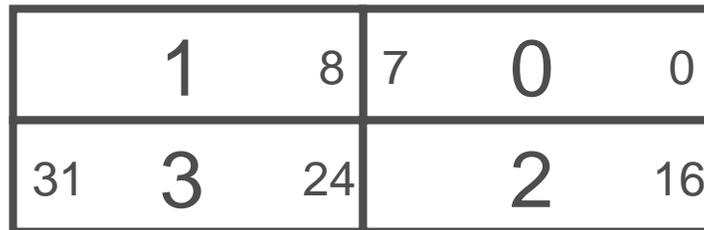


VR = OW

# 32 Bit Values in Memory

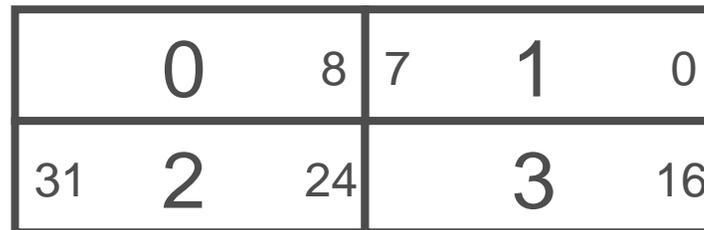


# Little Endian Storage vs OW Data Packing



No Problem

# Big Endian Storage vs OW Data Packing



## Problem

# Conclusion for 32 Bit Dose?

- On Big Endian Machines one must swap 16 bit words within 32 bit long words before writing DICOM or after reading DICOM