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**The Japanese situation of  
Video compression systems  
- the point of view of  
broadcasters-**

**Tutorial 20 minute  
NHK STRL Hiroo Arata**

# CONTENT

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○MPEG-2

○MPEG-4 and MPEG-4 AVC/H.264

○JPEG-2000

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# **MPEG-2**

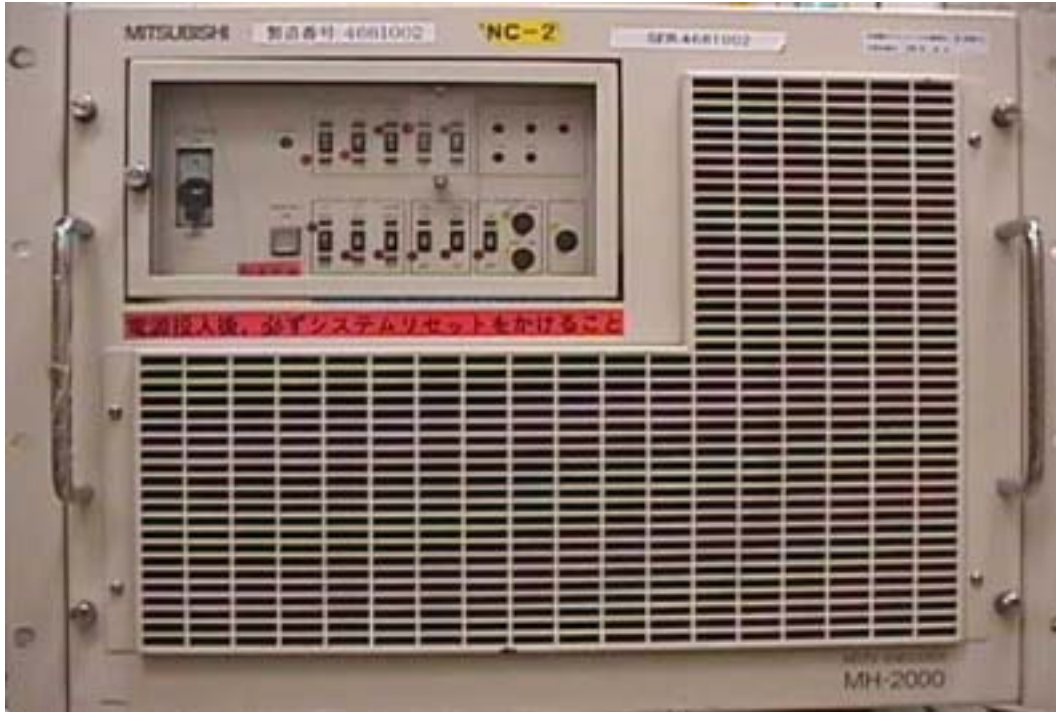
# MPEG-2 Encoder/Decoder

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- MPEG-2 is the world standard for Video compression system for Digital broadcasting.
- We have developed a postal card size MPEG-2 encoder/decoder.

<b>Fiscal Year</b>	<b>1996</b>	<b>2000</b>	<b>2002</b>	<b>2003</b>
<b>Volume Capacity Ratio [%]</b>	<b>100</b>	<b>28</b>	<b>5</b>	<b>0.5</b>
<b>Power Consumption Ratio [%]</b>	<b>100</b>	<b>13</b>	<b>4</b>	<b>1.0</b>

# Evolution of MPEG-2 Encoder



1996



2002

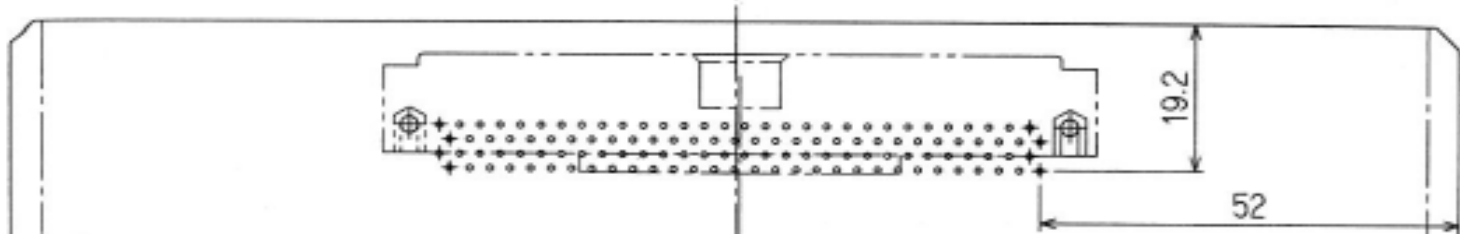


2000

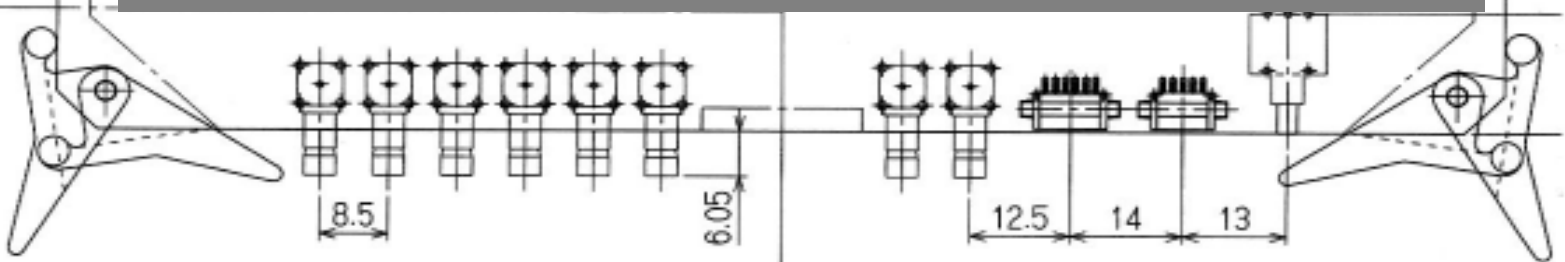


2003

# Postal Size MPEG-2 Encoder

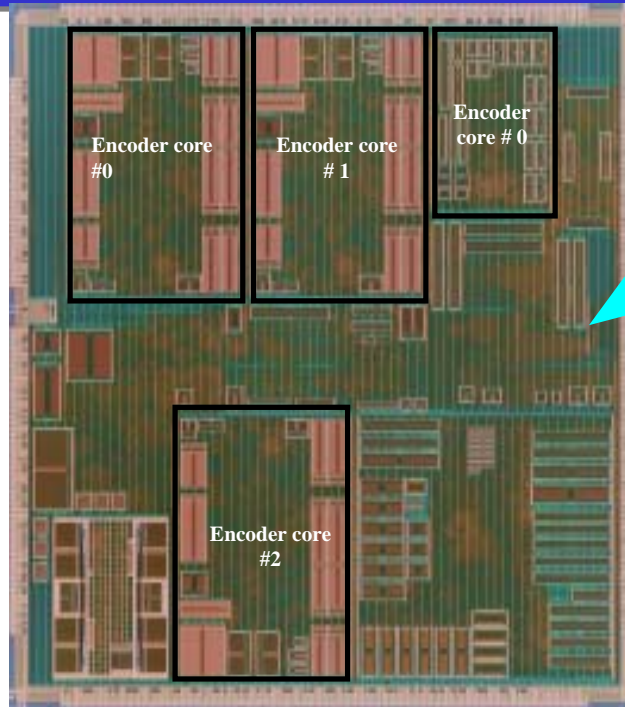


**SIZE:** 180mm × 120mm  
**VIDEO:** MPEG-2 422P@HL or MP@HL  
**AUDIO:** MPEG-2 AAC or MPEG-2 BC  
**INPUT:** SMPTE 292-M, HD-SDI  
**OUTPUT:** MPEG-2 TS, DVB-ASI



# VASA LSI Chip

**Inside  
picture  
of VASA chip**



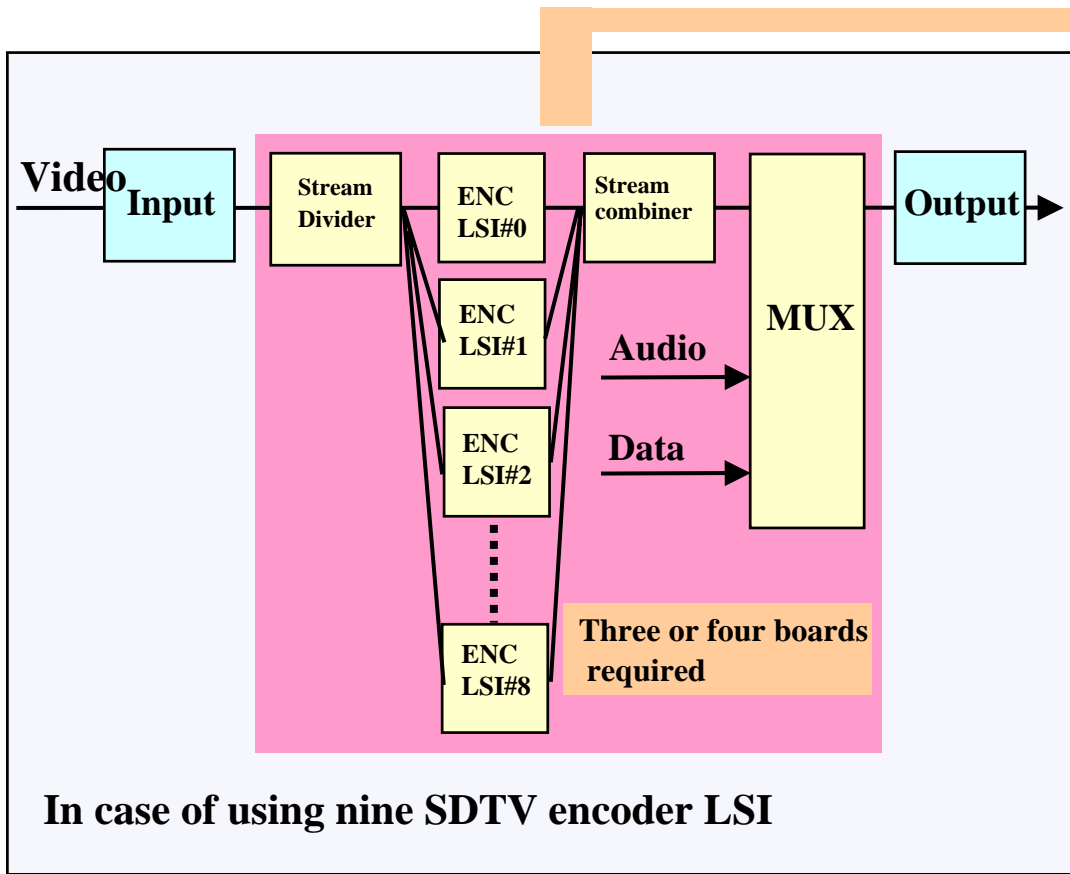
The VASA chip contains three Encoder/Decoder core for HDTV Compression/Expansion

**Specification  
of LSI**

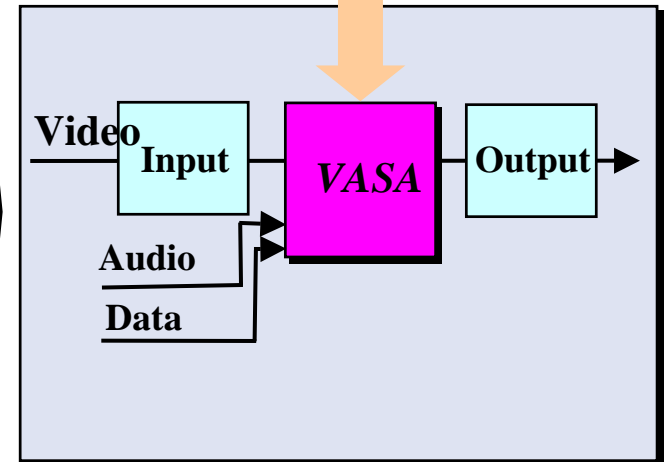
**Process Technology : 0.13- $\mu$ m 8-level metal CMOS**  
**Number of transistors : 61.4 million transistors**  
**Clock frequency : 200 MHz**  
**Power Voltage : Core: 1.5V / I/O: 3.3V / DDR: 2.5V**  
**Power Consumption : 3.0 W (at 1080i 422P@HL)**  
**Package : 1008-pin FCBGA (35 mm x 35 mm)**

# An Example of HDTV Encoder System Using VASA Chip

Conventional system



VASA chip system

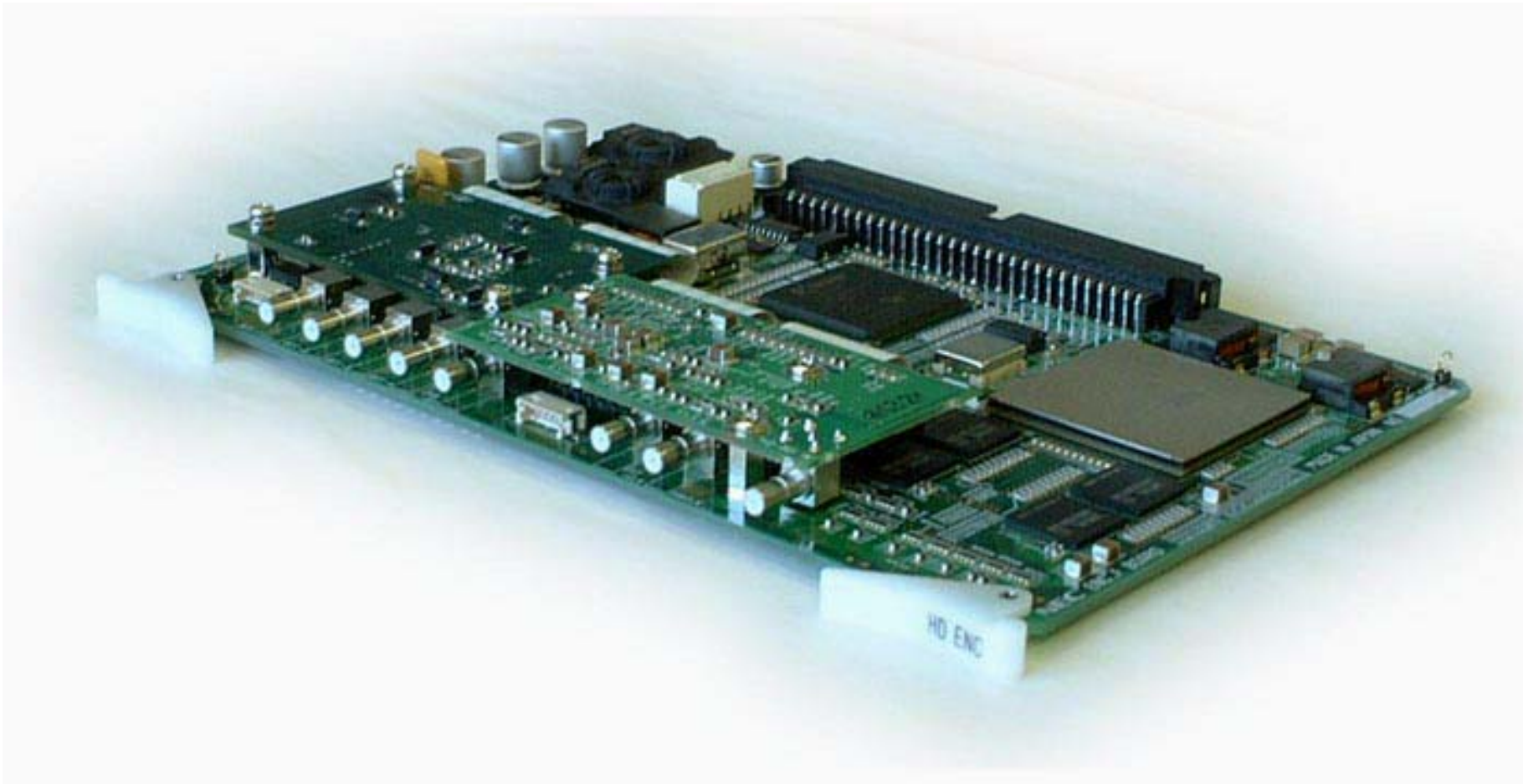


Realize the one board system for HDTV encoder. Conventional systems require multi board.

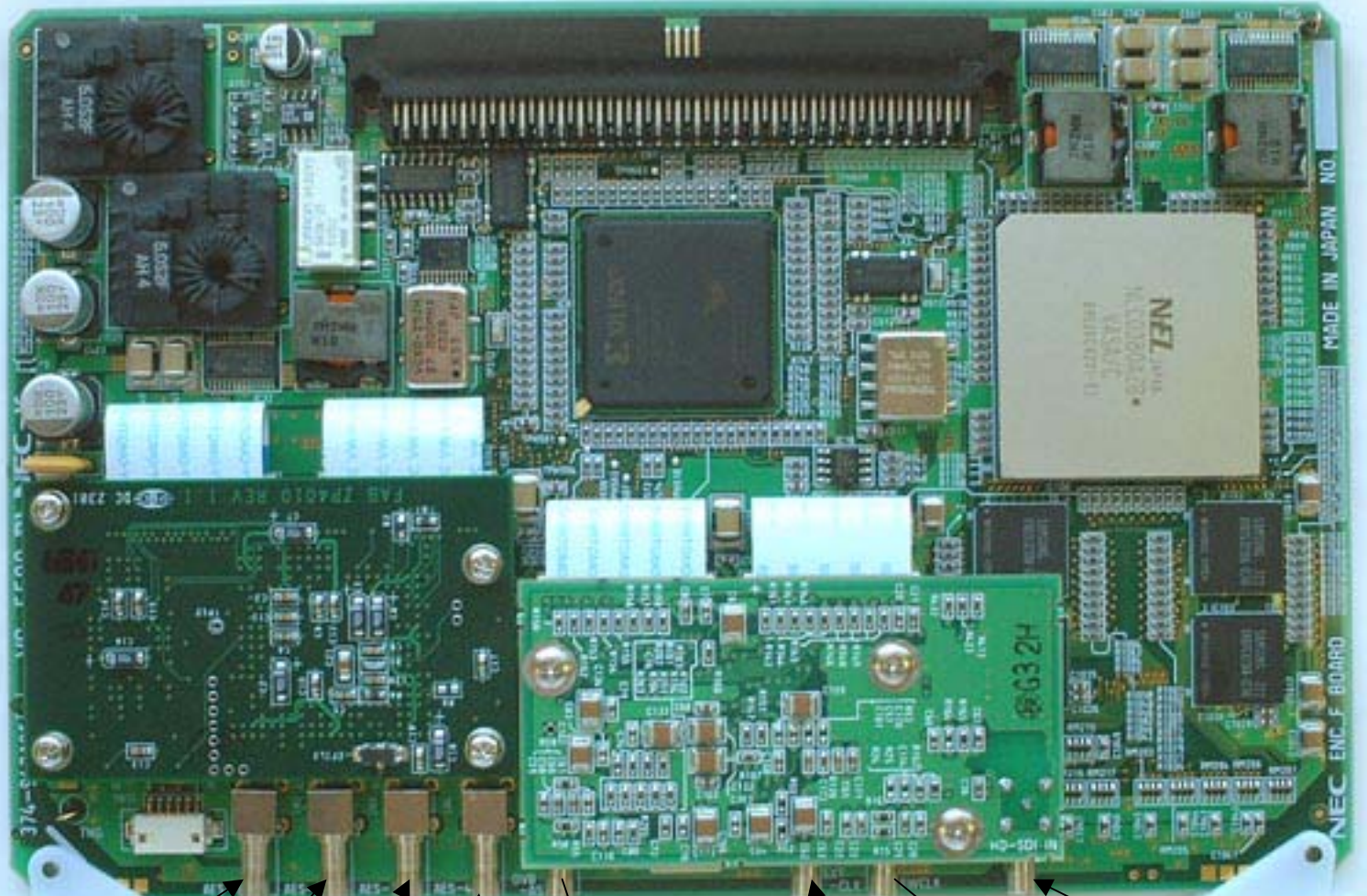


# External View of MPEG-2 Encoder

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# Encoder(Upper side)

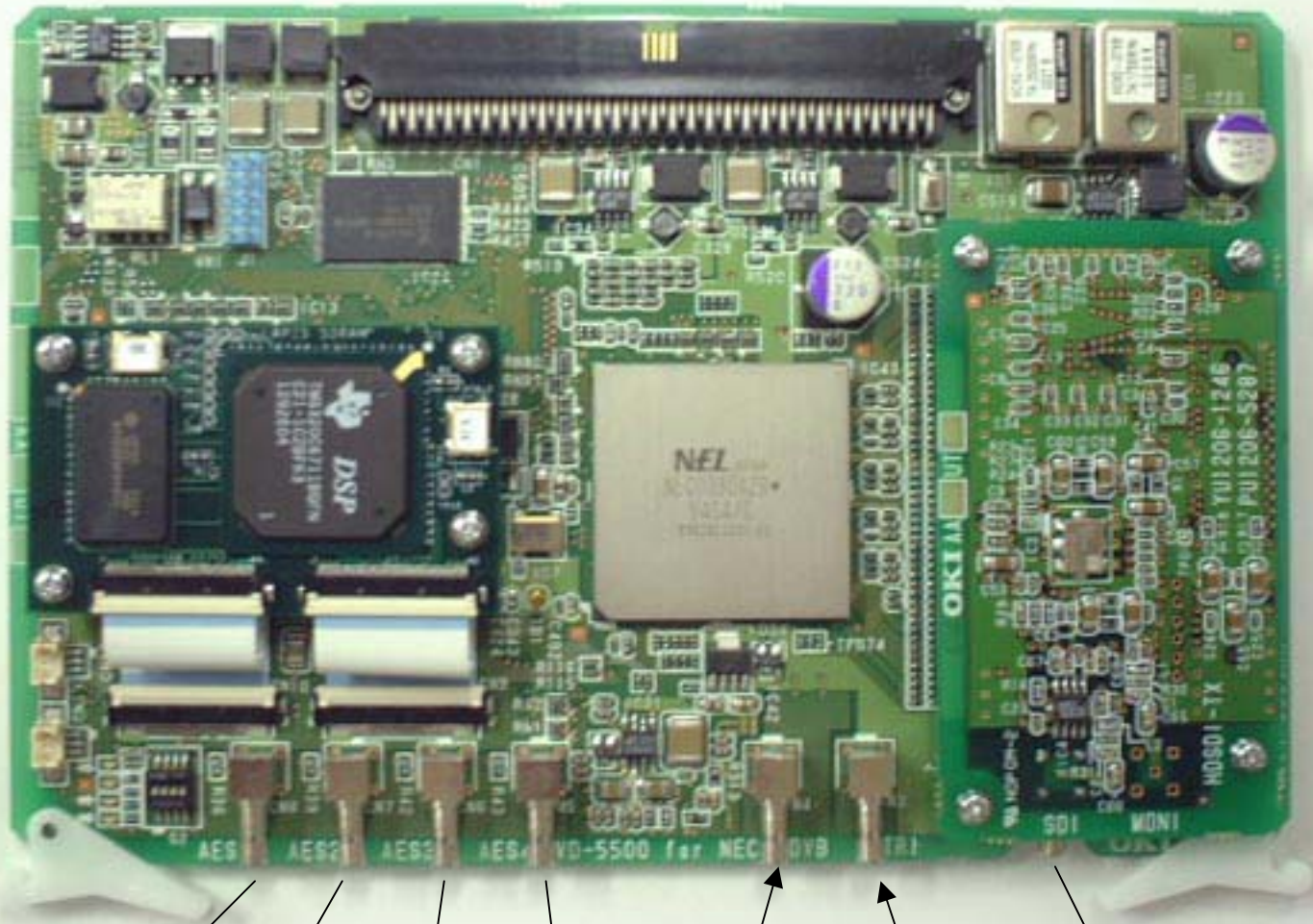


**AES1 AES2 AES3 AES4 DVB OUT TS CLK IN WCLK OUT SDI IN**

# External View of MPEG-2 Decoder



# Decoder(Upper side)



AES1 AES2 AES3 AES4 DVB IN TRISYNC SDI OUT

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# **MPEG-4 and MPEG-4 AVC/H.264**

# Feature of MPEG-4 AVC/H.264

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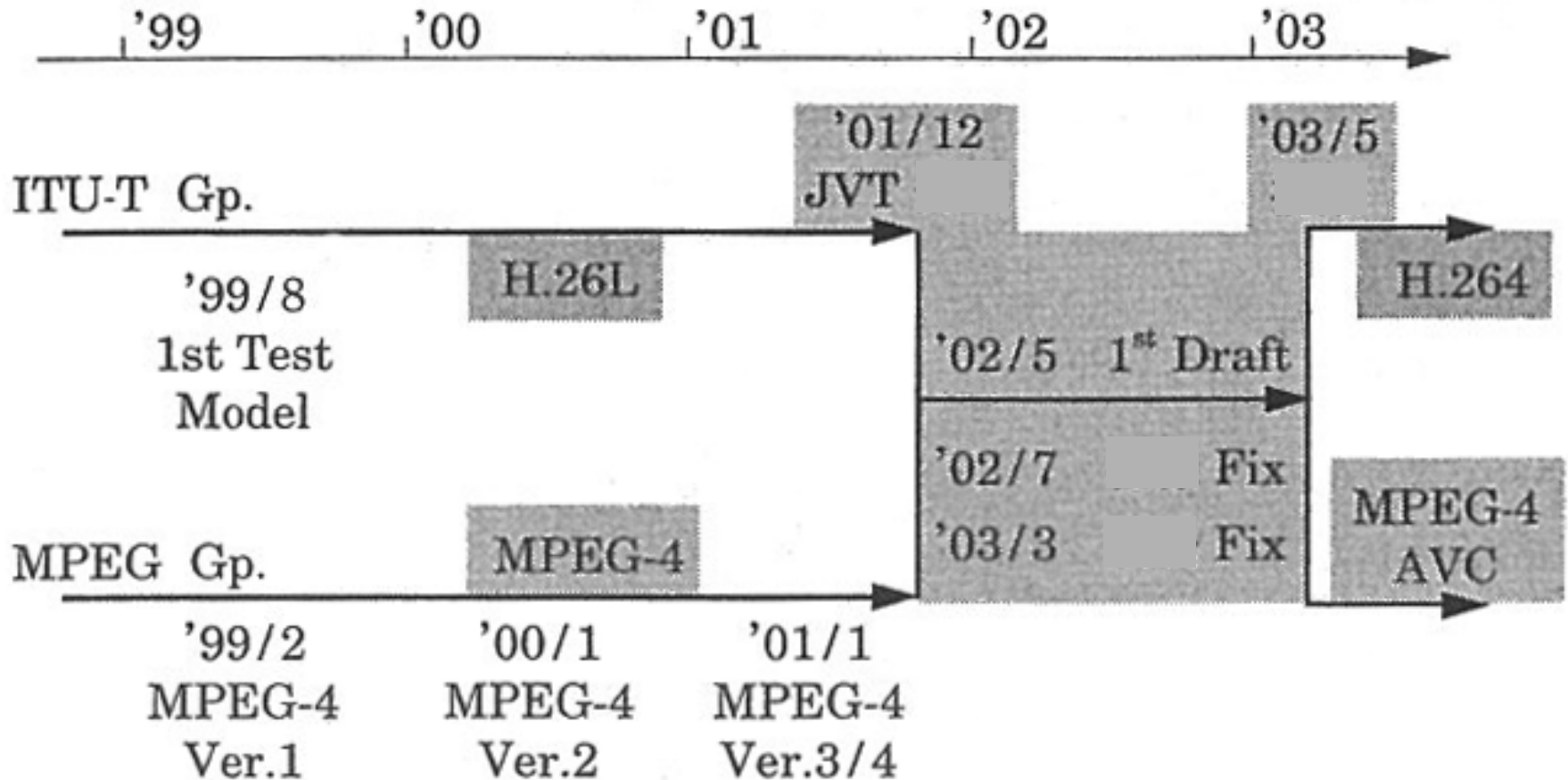
- **The Encoding efficiency of MPEG-4 AVC/H.264 is two times better than MPEG-4.**
- **Required high complexity and heavy processing.**
- **No compatibility to MPEG-2/MPEG-4 standards.**

# **ISDB-T Adopts MPEG-4 AVC/H.264**

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- We have adopted the MPEG-4 AVC/H.264 instead of MPEG-4 for one segment ISDB-T broadcasting.**
- We have a plan of starting the one segment broadcasting for handy phone in 2005 fiscal year.**

# History of H.264 and MPEG-4/AVC







# Feature of MPEG-4 AVC/H.264

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- Improvement of spatial predictor
- Added loop filter

# Loop Filter of AVC/H.264

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	<b>Loop Filter</b>	<b>Merit</b>	<b>Demerit</b>
<b>MPEG-4 AVC/H.264</b>	<b>Yes</b>	<b>Decrease of blocking noise</b>	<b>Blurring processing is heavy</b>
<b>MPEG-2 MPEG-4</b>	<b>No</b>	<b>Processing is light</b>	<b>Blocking noise</b>

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# **JPEG-2000**

# Feature of JPEG-2000

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## Successor of JPEG for studio use

### <MERIT>

○ Short delay time in encoding/decoding

○ Support of hierarchical encoding

### <DEMERIT>

○ Low video compression efficiency

# SNR of JPEG2000 and MPEG-4

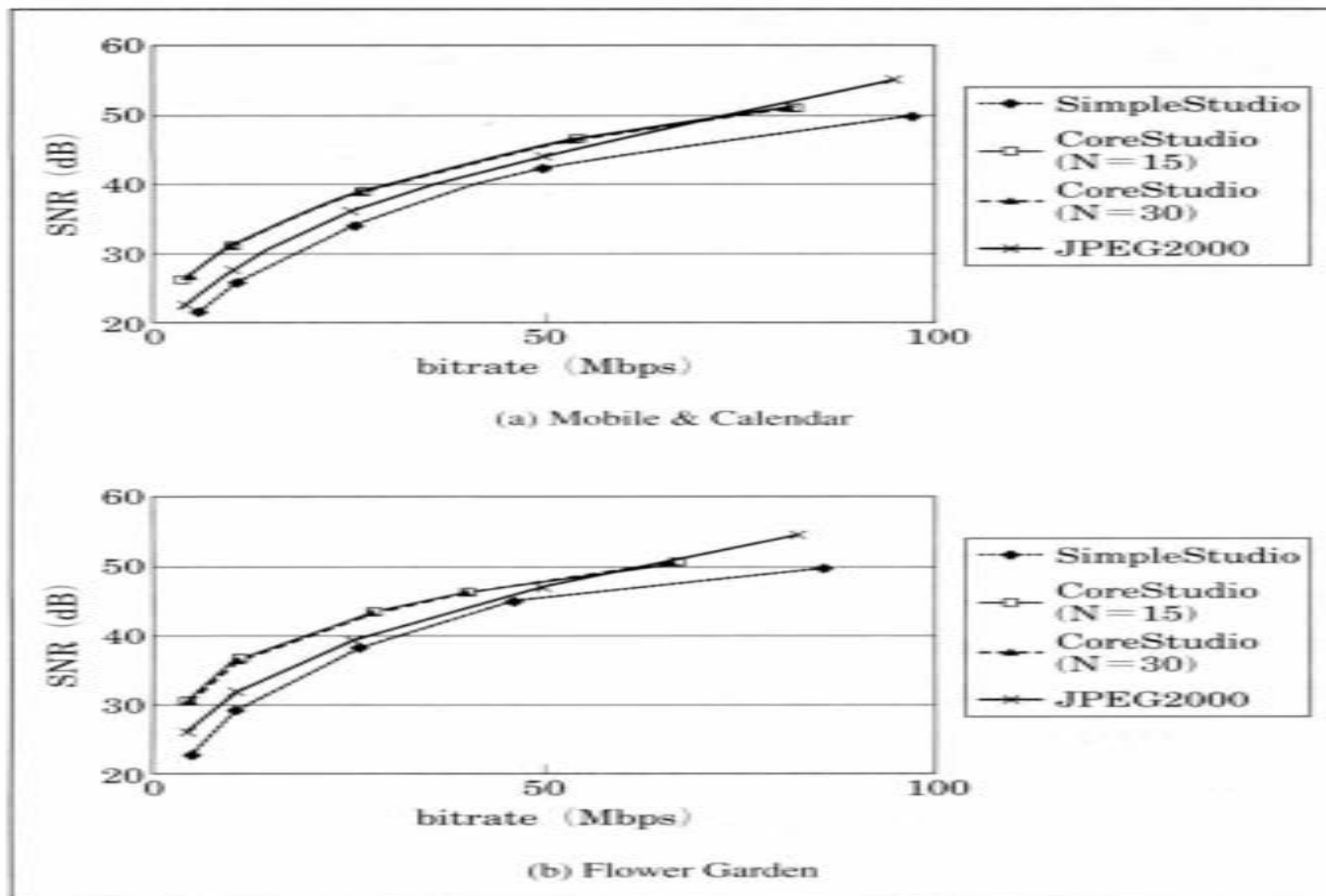
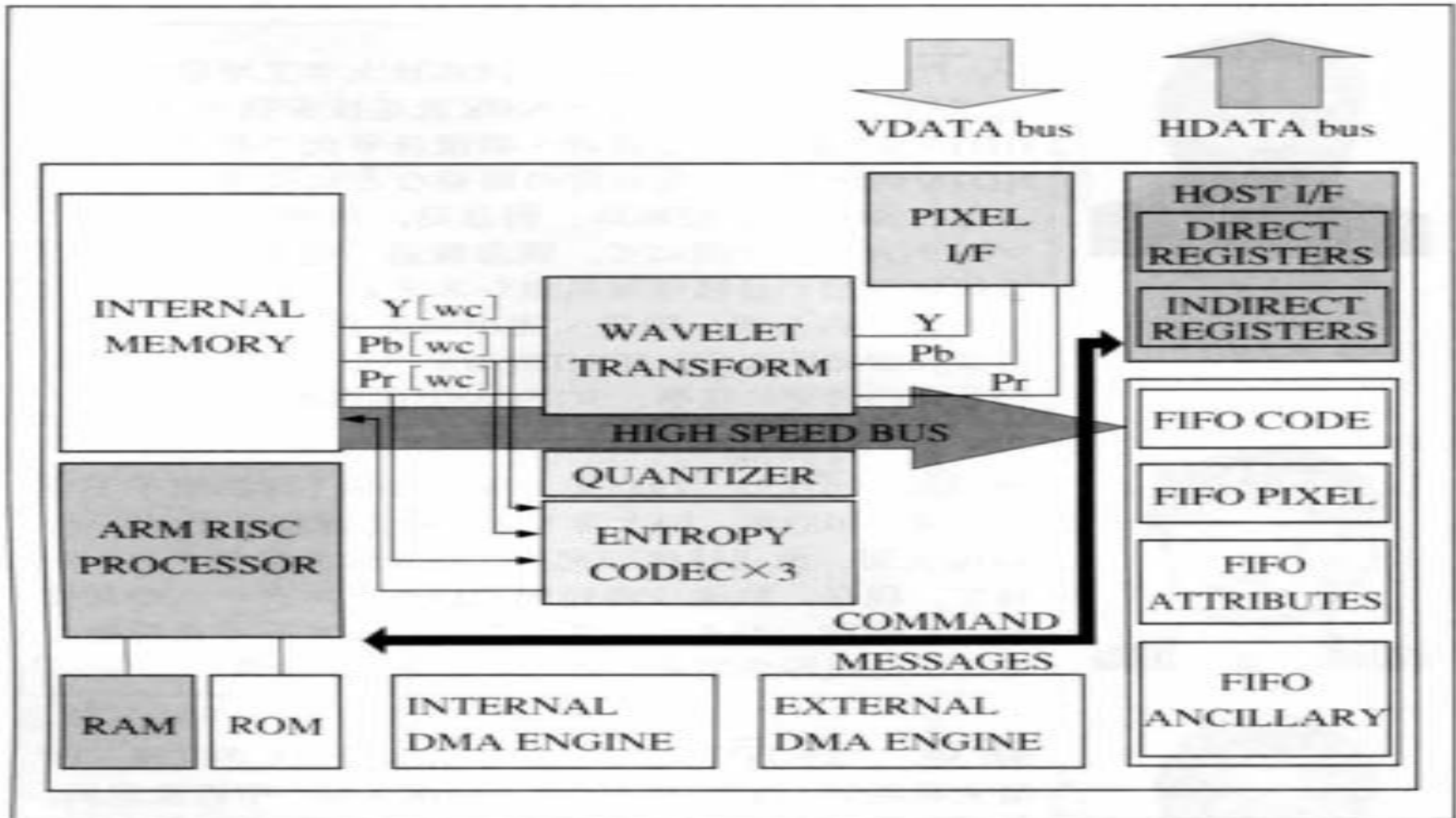
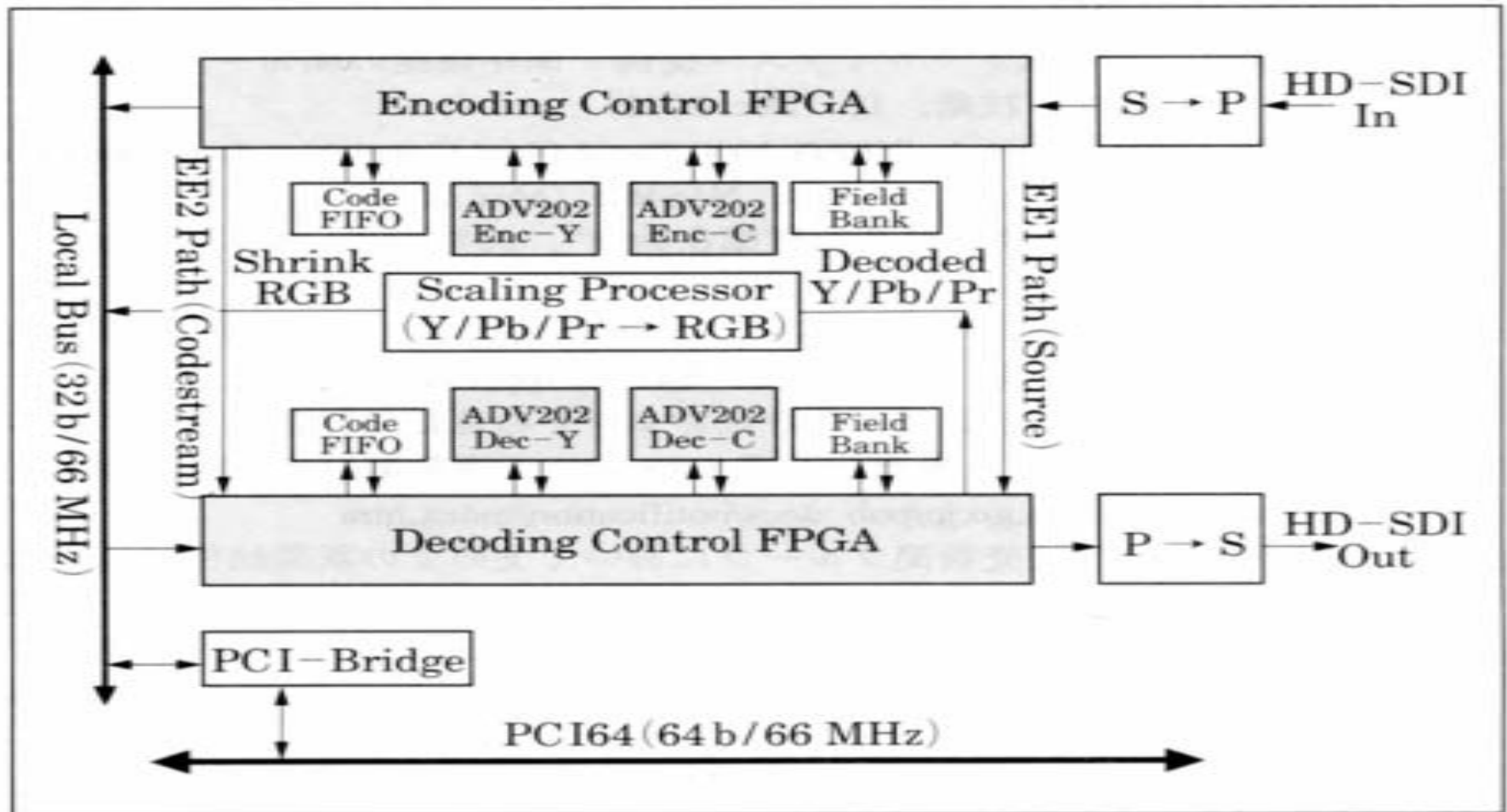


図7 JPEG2000 part-1とMPEG-4 Studio Profile (Simple StudioおよびCore Studio) の動画像符号化性能の比較

# Schematic Diagram of JPEG 2000 LSI (ADV202)



# Schematic Diagram of JP-2000 Encoder/Decoder



Architecture of JPEG-2000/Encoder decoder



# HDTV Encoder/Decoder of JPEG-2000

