

Panasonic

ideas for life

2011

Panasonic Integrated Platform for Digital Appliances

UniPhier[®]

From the next generation's creativity
comes the possibility



Universal Platform
for High-quality
Image Enhancing
Revolution

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System LSI Featuring the UniPhier Architecture

Introduction

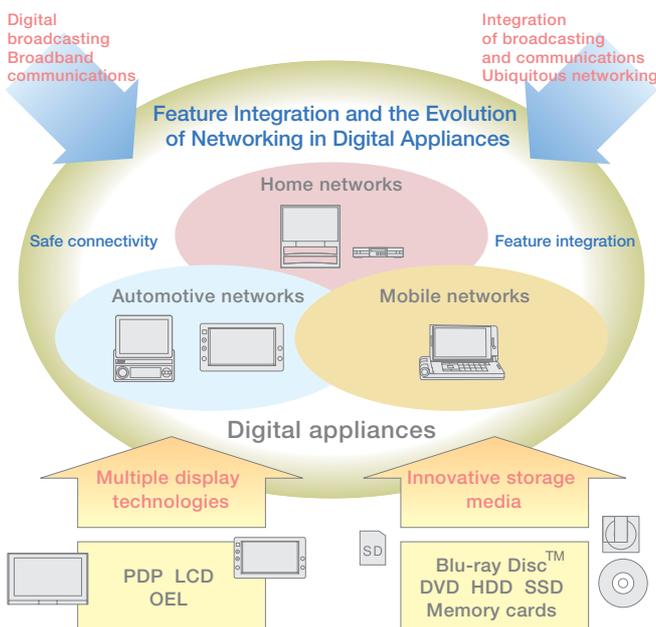
Anticipating ubiquitous networking

The age of the Internet is giving way to an age of ubiquitous networking, a series of technologies that allow individuals to access the information they desire, anytime and anywhere by accessing networks from a range of devices. The society in which you live is changing to reflect this age of ubiquitous networking and the new value it makes possible.

Watchwords in the Age of Ubiquitous Networking

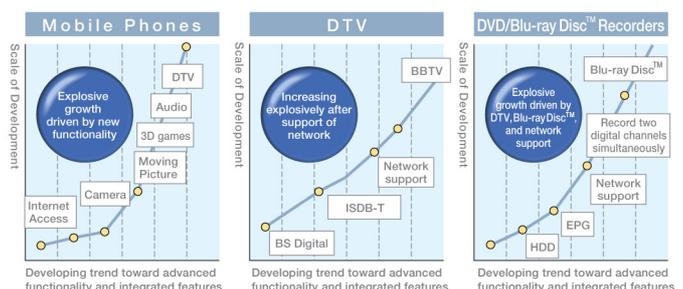
Digital appliances in today's age of ubiquitous networking are being transformed into devices capable of offering a variety of services in a seamless, simple, and safe way based on the watchwords of "feature integration" and "safe connectivity."

Against this backdrop, an integration of broadcasting and personal communications is being driven by ongoing moves toward digital broadcasting, broadband communications, multiple display technologies, and ever more innovative storage media.



Challenges in the Development of Digital Appliances

The rapidly developing trend toward advanced functionality and integrated features in digital appliances is driving swift growth in the scale of software development for embedding in electronic devices. The pace of change is causing concern among manufacturers about delays in the product development cycle and the possibility of end users experiencing quality problems.



In addition to the rapidly expanding scale of software development, challenges unique to digital appliances are also becoming more visible.

These include the following new issues related to the evolution of network-capable digital appliances with high performance and advanced functionality:

- (1) The ability to maintain real-time speed in high-quality audio/video processing and congestion control
- (2) Product startup time, responsiveness, and durability
- (3) Security issues such as protection of copyrighted content and personal information
- (4) Independence and performance of product-specific multimedia functionality

What is UniPhier?

Universal Platform for High-quality Image Enhancing Revolution

The UniPhier name also signifies the platform's goal of integration.



UniPhier

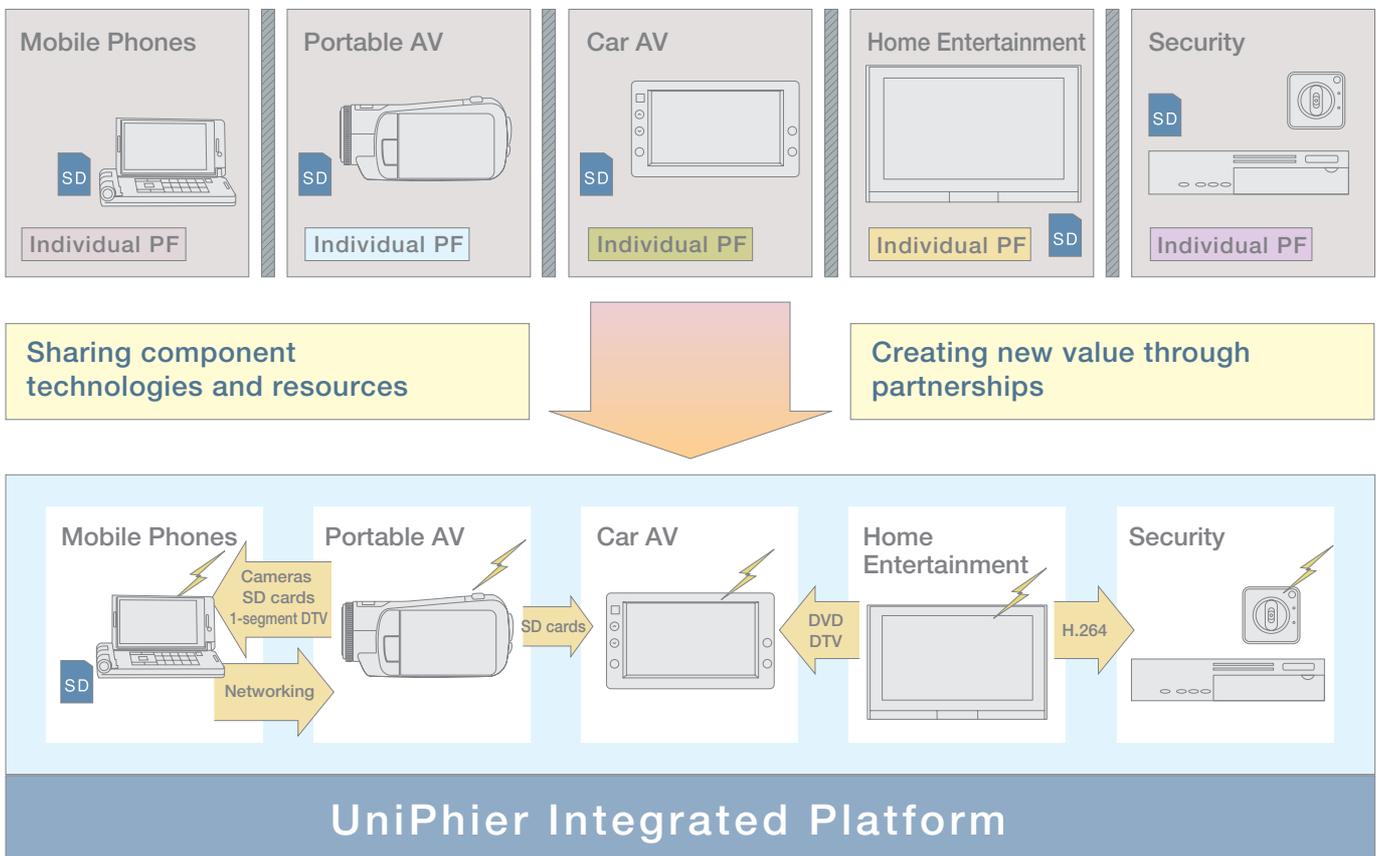
This innovative platform UniPhier enables the sharing of software and hardware (system LSI) resources among product areas, driving a dramatic increase in the overall efficiency of the development process and making possible rapid progress in the development of future digital appliances.

UniPhier brings excitement to the customer with multimedia solutions that combine high-quality audio and video with low power consumption, real-time processing, and secure technology, making good on the promise of ubiquitous networking to make services easily accessible to all people in all locations.

Share and Reuse Software and Hardware Resources Across Product Groups

The traditional approach of developing product-specific platforms has left a legacy of pronounced variations in the technological sophistication of different product areas. Developers seeking to create new value or share component technologies and software resources have had to overcome these obstacles in their quest to realize a more rational and streamlined development process. Panasonic's UniPhier integrated platform for digital appliances obliterates the barriers between product groups, allowing designers to dramatically improve their development efficiency and design quality by sharing design resources and value.

UniPhier Integrated Platform Concept



UniPhier Integrated Platform Architecture

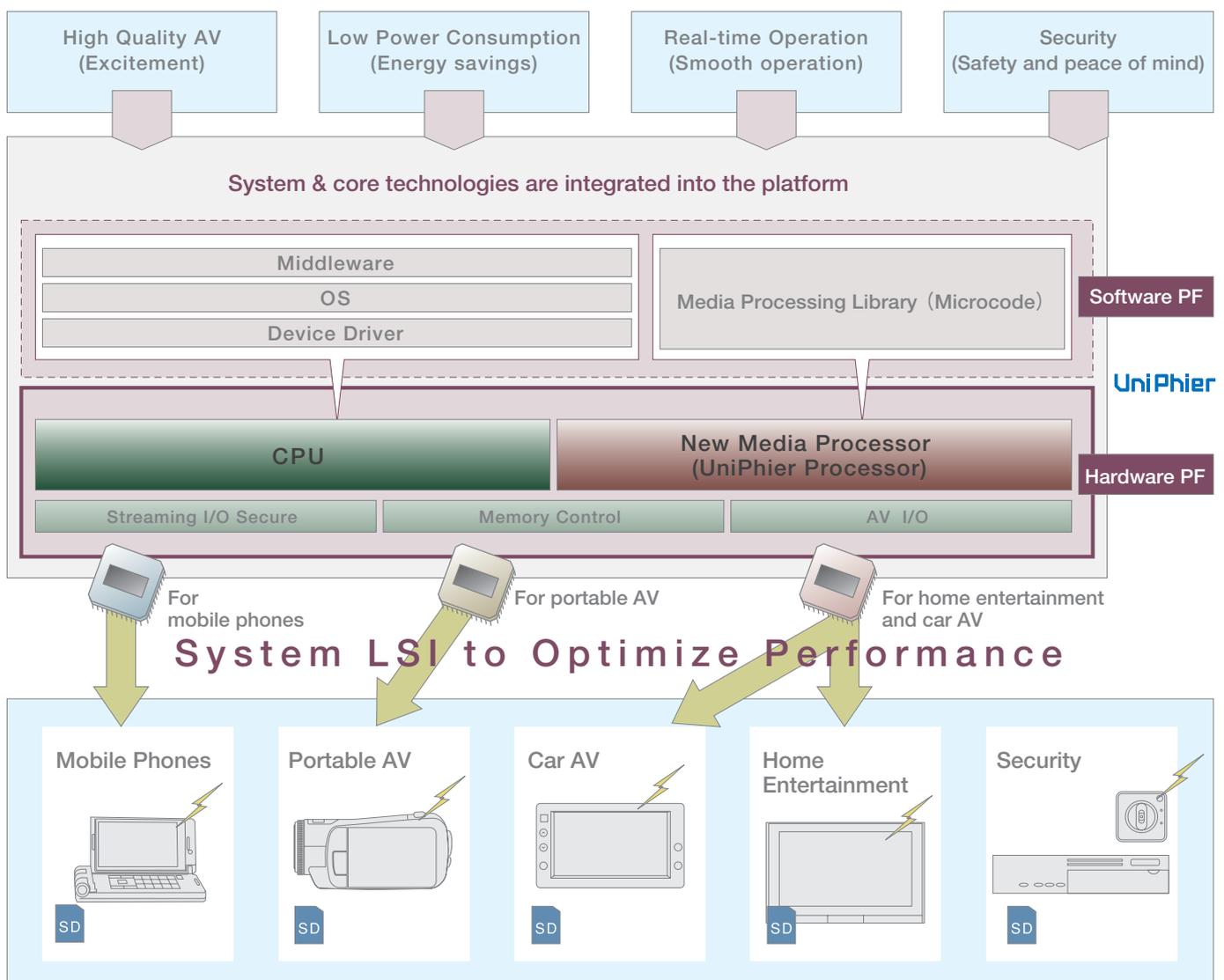
The UniPhier integrated platform for digital appliances combines hardware and software elements. Its hardware component consists of a CPU that provides overall system control, a UniPhier processor that offers a standardized media processing architecture by using dedicated libraries to perform codec and other processing, a stream I/O block that performs CPU-independent encryption processing and data transfers, a memory control block with a memory scheduler designed to maximize system performance, and an AV I/O block with a high-performance graphics engine and advanced audio and video input/output capabilities. Its software component consists of device drivers, an operating system, middleware, and a media library (provided in microcode) that implements a variety of codec environments.

UniPhier brings the components demanded by the digital appliances of today's age of ubiquitous networking—including high-quality audio/video technology with the power to excite and inspire users, power-saving technologies to conserve energy, real-time capabilities that enable smooth operation, and a secure architecture designed to ensure user safety and peace of mind—together as the system and core technologies of a single integrated platform. UniPhier system LSIs are ideal for applications ranging from mobile phones where low power consumption is a requirement to home entertainment and home networking products that demand high-performance codec processing.

UniPhier Integrated Platform for Digital Appliances Architecture

Media processor based scalable hardware platform

Software platform that makes possible reuse of software among product fields



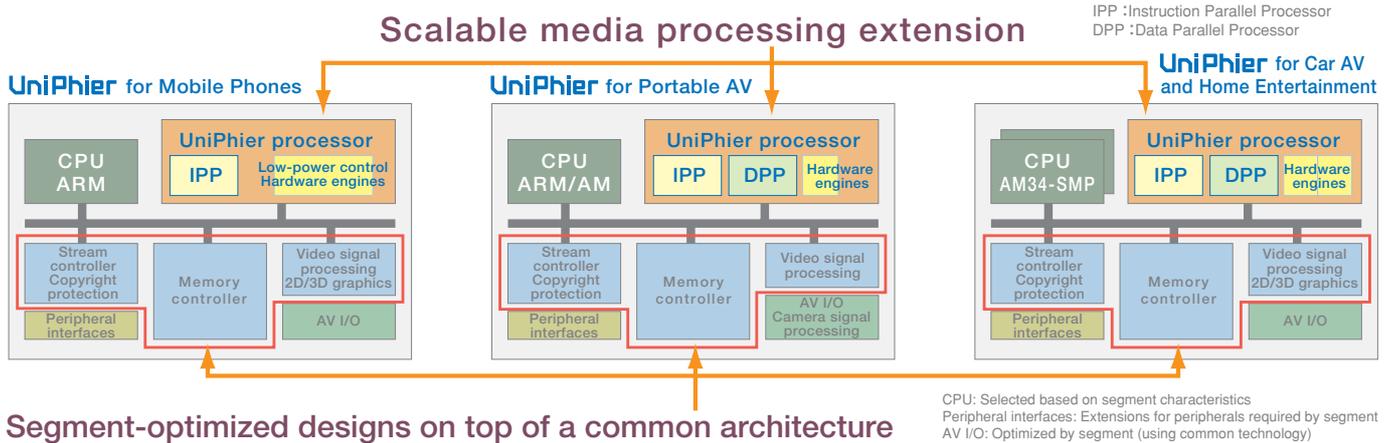
At the Heart of the Hardware Platform: The UniPhier Processor

Standardizing the Basic Architecture and Customizing Function Blocks for Specific Products

The UniPhier system LSI's hardware platform consists of five components: a UniPhier processor core that incorporates a range of Panasonic audio/video processing technologies developed for dedicated DSP solutions in a variety of product areas, a CPU, and stream I/O, memory control, and AV I/O blocks.

Contributing to the UniPhier processor's unique suitability for use in system LSIs that are optimized for specific product areas is its combination of an instruction parallel processor (IPP) with support for the C and C++ languages, exceptional computational performance, low power consumption, a data parallel processor (DPP) for flexible extensibility as dictated by the required system performance, and an assortment of hardware engines and accelerators.

● Hardware and Architecture Sharing



Software Platform with Resource Sharing and Reuse

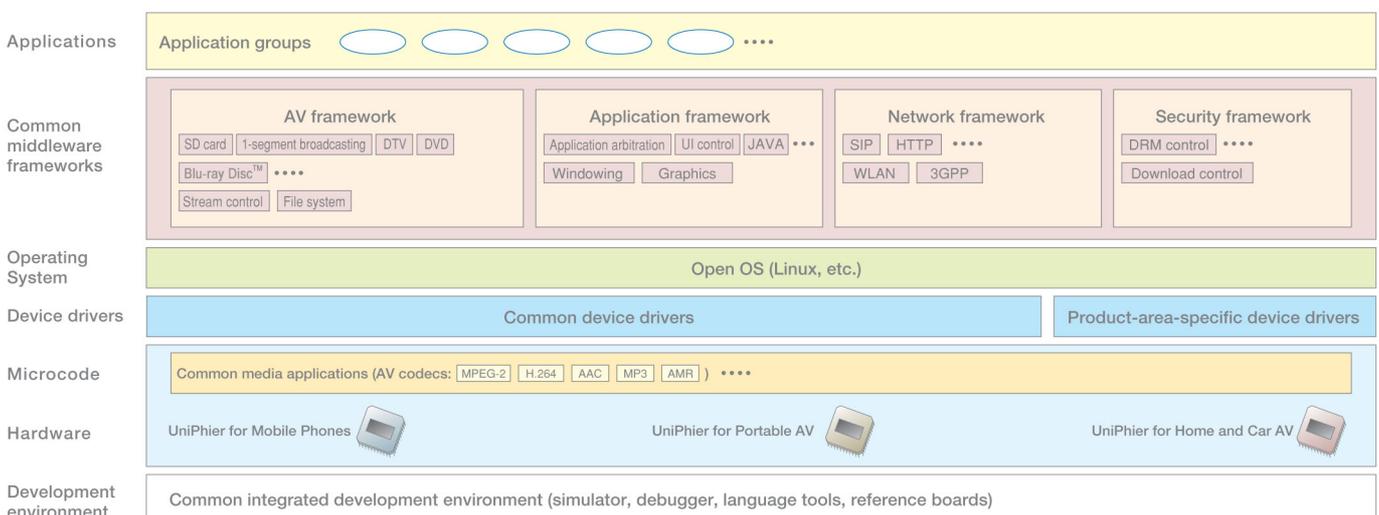
Dramatically Improved Software Development Efficiency (Productivity)

The software platform integrates software interfaces and architectures that have traditionally been specific to individual product areas into a common platform consisting of middleware, an operating system, and device drivers. This approach enables software resources to be shared and reused across product areas to realize significant improvements in total product development efficiency and design quality, accelerating the development of combination products compared to the conventional product-specific platform design philosophy.

● Software and Architecture Sharing

Build a common software framework based on an open software environment

⇒ Software assets can be accumulated and shared in a way that transcends product segments.

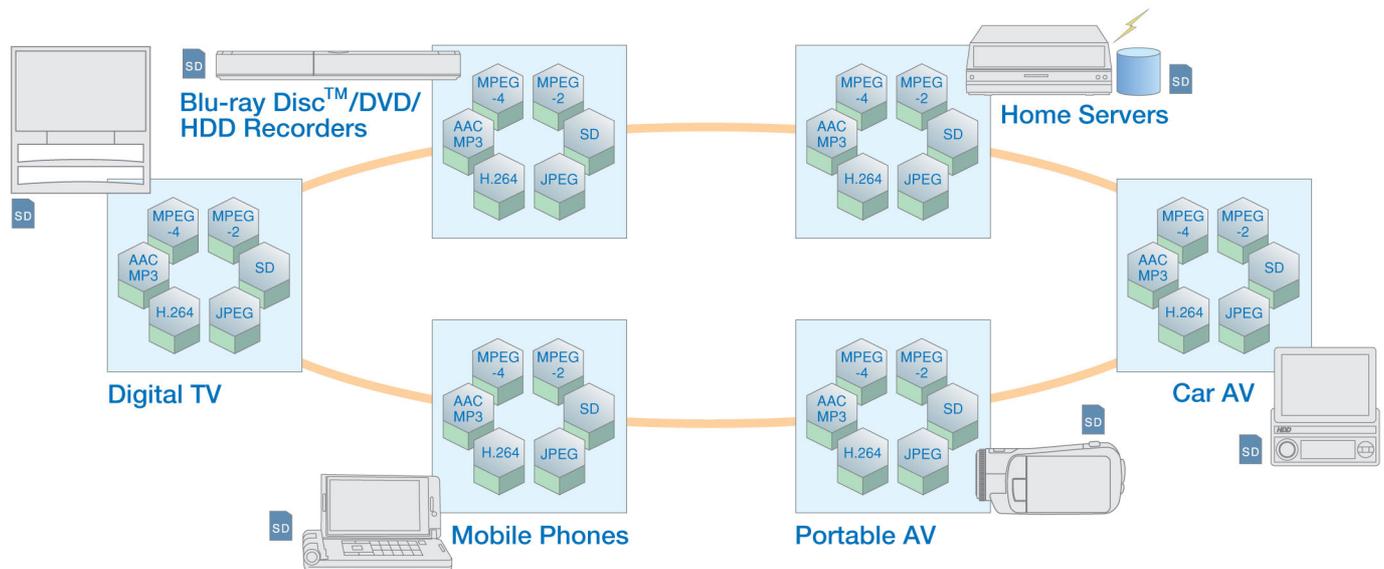


Component Technologies for Implementing High-quality, High-performance Audio/Video Devices

The UniPhier brings together a range of Panasonic component technologies developed for mobile phones and portable, car, and home audio/video equipment.

- (1) High-efficiency codec processing delivers high-quality audio and video.
- (2) Optimized power control at the system and semiconductor levels makes it possible to develop low-power LSIs.
- (3) Optimized distribution of audio/video processing and CPU-based application processing enables real-time audio and video processing.
- (4) Hardware- and software-based security forms the basis for a flexible, robust, and secure environment that is capable of protecting the integrity of media content and personal data.

High-efficiency Codec Groups Included in the UniPhier Architecture



UniPhier's Low-power Technology

● Low-power architecture

Multi-processor architecture

- Parallel processing optimized for media processing
- Multi-processor (IPP/DPP/CPU) parallel processing
- ⇒ Media processing at low clock frequencies

Stream DMA

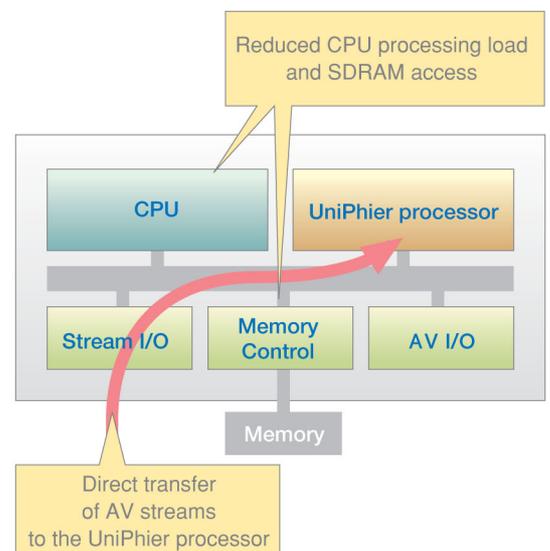
- Hardware support for bit-string processing unique to streaming applications; direct transfer of audio/visual streams to the UniPhier processor
- ⇒ Reduced CPU processing load and SDRAM access

Low-power display control

- LCD backlight control
- Screen effects using built-in memory and reduced external memory access

● Low-power circuit technology

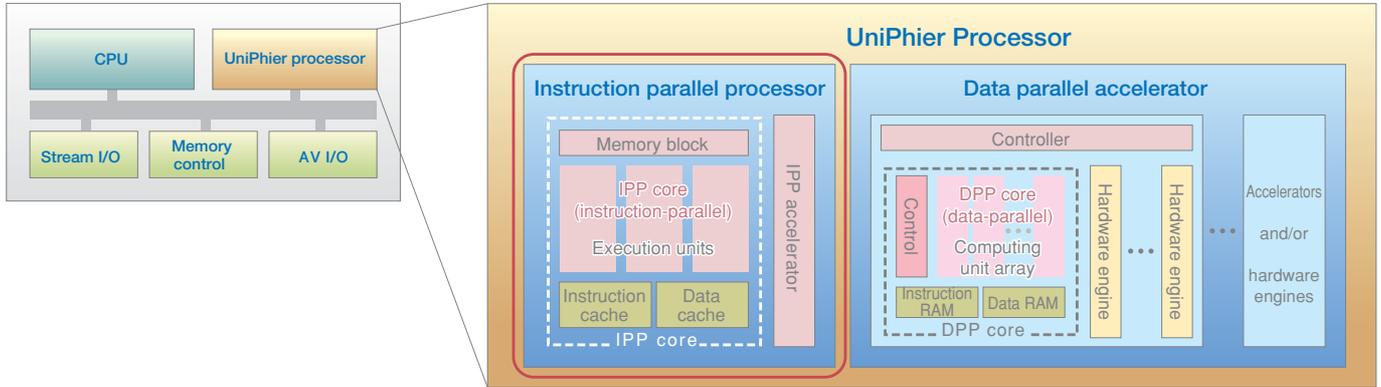
- Aggressive gated clock control and block-specific power supply separation control
- Board potential control, etc.



UniPhier as the Ideal Real-time Processing Platform

Assuring audio/video performance during convergent processing

- The UniPhier processor's virtual multi-processor architecture guarantees the performance of individual tasks during convergent processing.
- The memory control block guarantees individual data transfers for multiple DMA masters.



Reducing the CPU's processing load by masking real-time processing

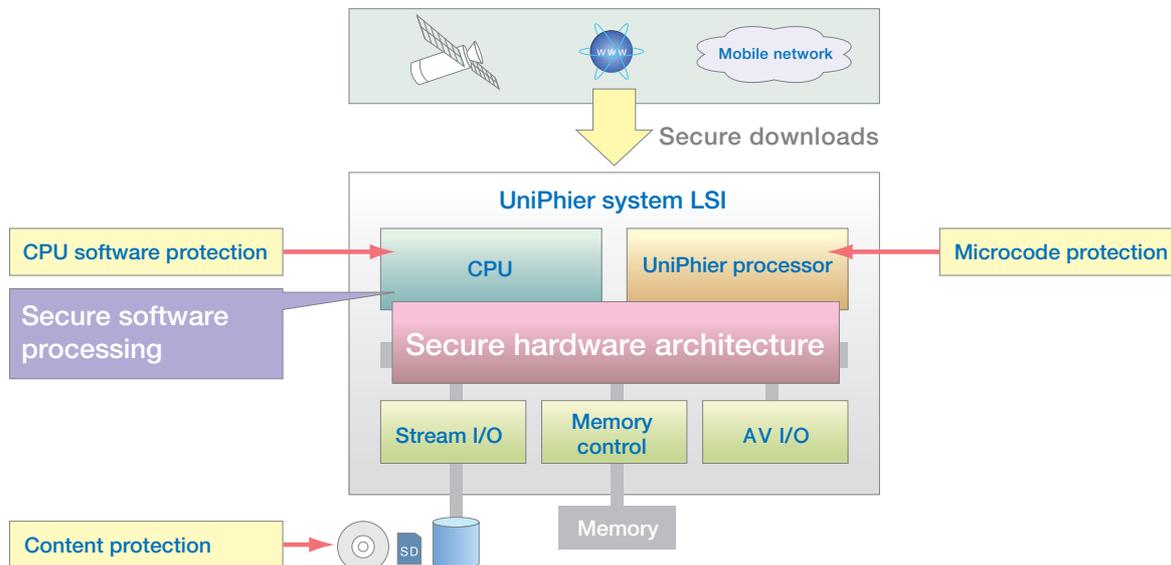
- Real-time processing is masked to the UniPhier processor, freeing real-time processing from the operating system.
- ⇒ This approach assures audio/video and communications performance while reducing the processing load on the CPU.
- Example: Audio/video stream multiplexing and separation, audio/video protocol processing, audio/video synchronization, etc.

UniPhier Secure Architecture

The UniPhier's secure hardware architecture and software control provide processing that is flexible, robust, and secure.

⇒ UniPhier delivers the safety and peace of mind for which digital appliances are known.

Copyright protection, content distribution DRM, protection of personal information, safe program updates, service expandability



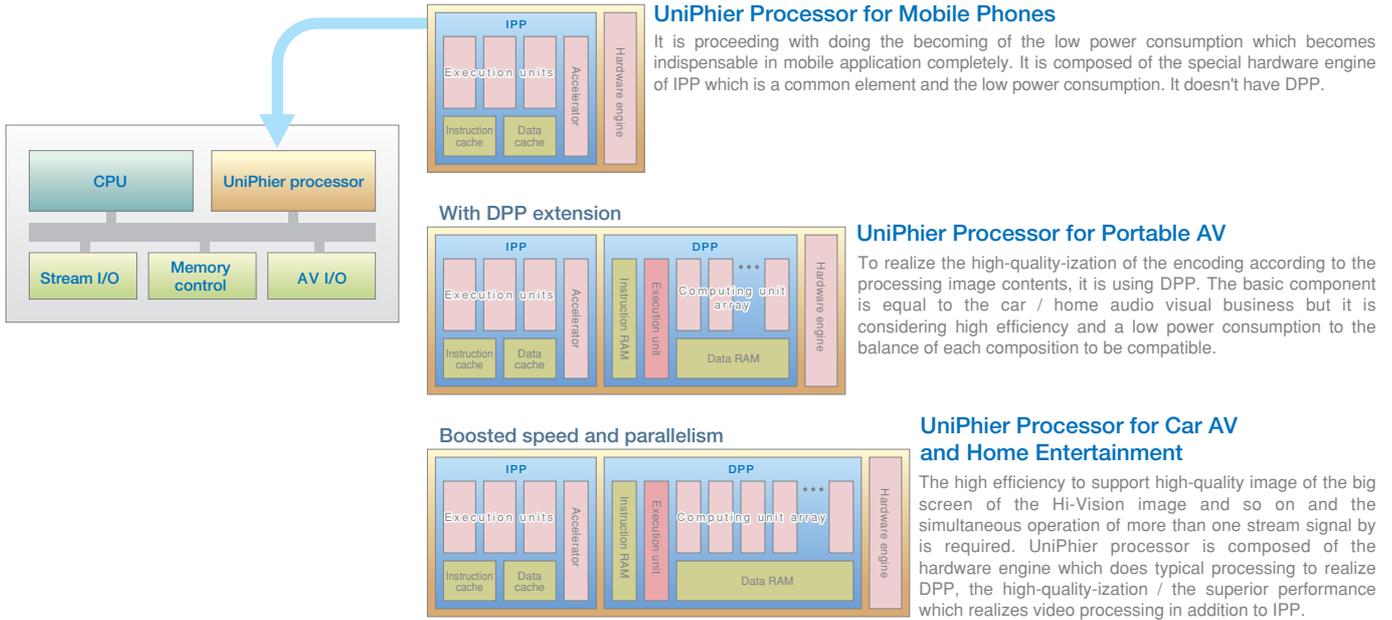
UniPhier System LSI Features

Thanks to its flexibility and extensibility, the UniPhier processor can be used in applications ranging from mobile phones requiring low power consumption to high-performance home entertainment products. Additionally, the architecture simplifies the development of system LSIs that meet the requirements of specific products.

Scalable architecture

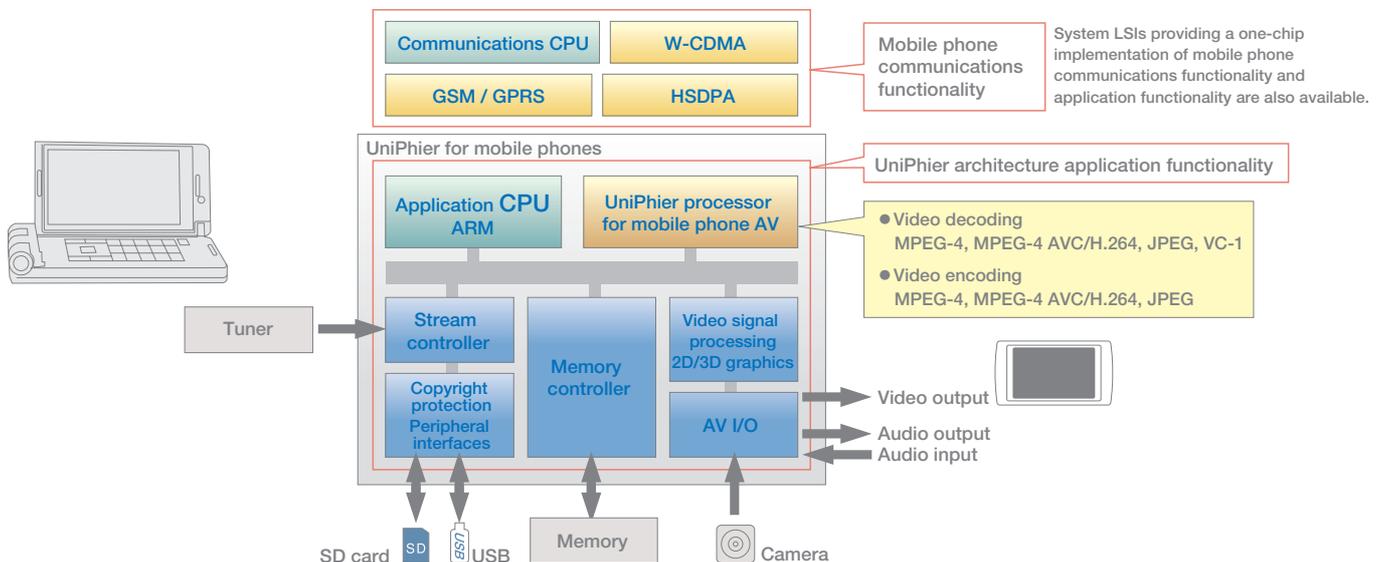
- The UniPhier processor anchors an extensible architecture that can be configured according to product application, enabling efficient product development.
- Standardized APIs for software compatibility and sharing of software resources

Scalable media processing architecture



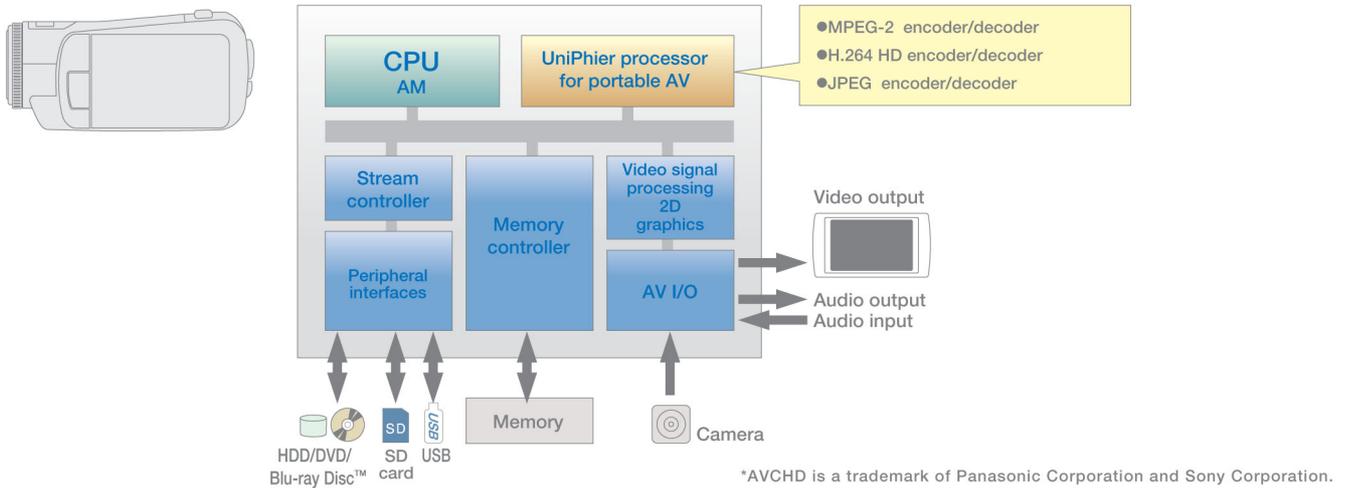
UniPhier System LSI for Mobile Phones (Example)

- UniPhier processor capable of implementing high-performance mobile codecs
- Ability to implement high-quality, high-performance AV playback thanks to a high-speed CPU and dedicated display processing engine
- Support for advanced applications such as 1-segment DTV



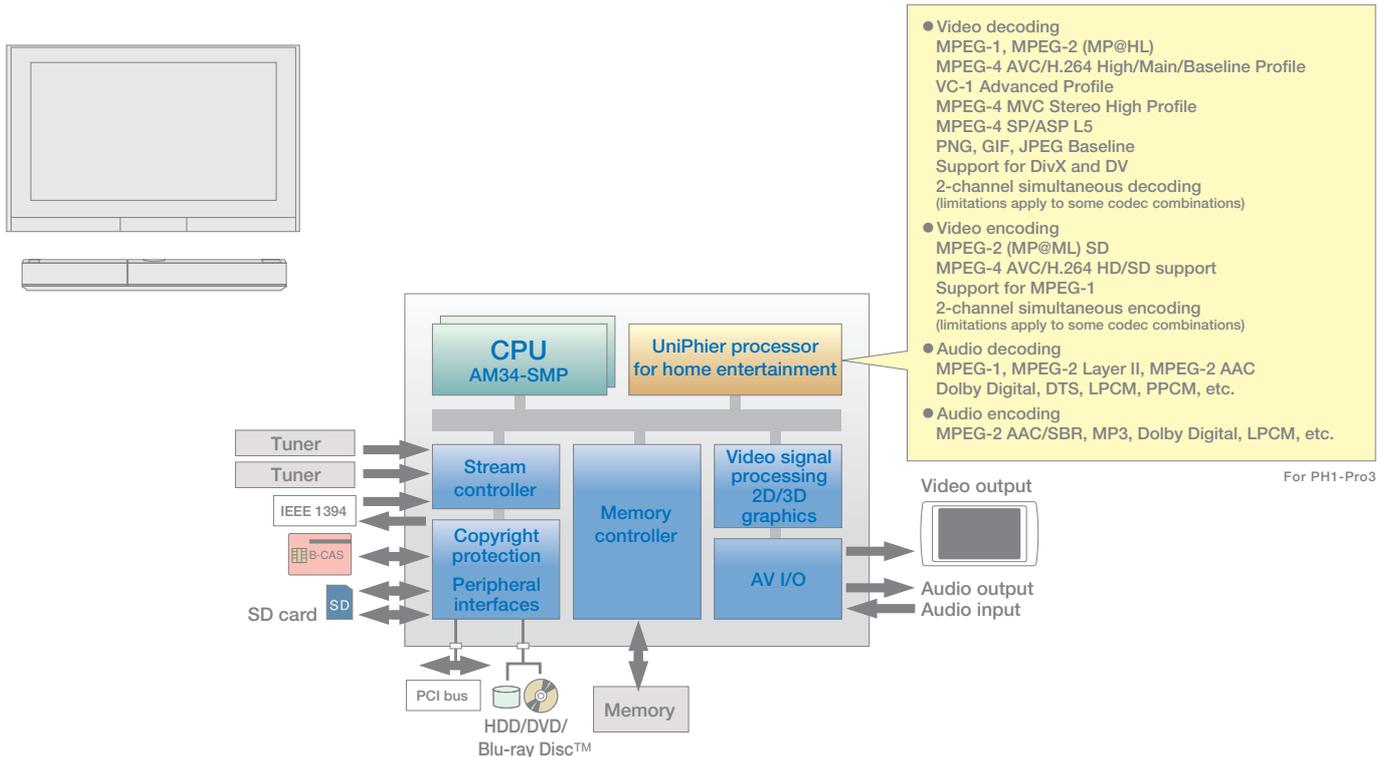
UniPhier System LSI for Portable AV (Example)

- UniPhier processor capable of implementing high-performance codecs for portable audio/video devices
- CPU combining low power consumption and high performance
- Implementation of H.264 recording and playback of full-HD AVCHD standard compatible video
- Interfaces for SD card, optical disc, HDD, and USB media



UniPhier System LSI for Home Entertainment (Example)

- UniPhier processor capable of simultaneously decoding dual HD video streams
- Dual-core CPU combining low power consumption with high performance
- High-quality video signal processing with a built-in dedicated graphics engine
- Stream I/O group with Blu-ray Disc™ and HDTV support

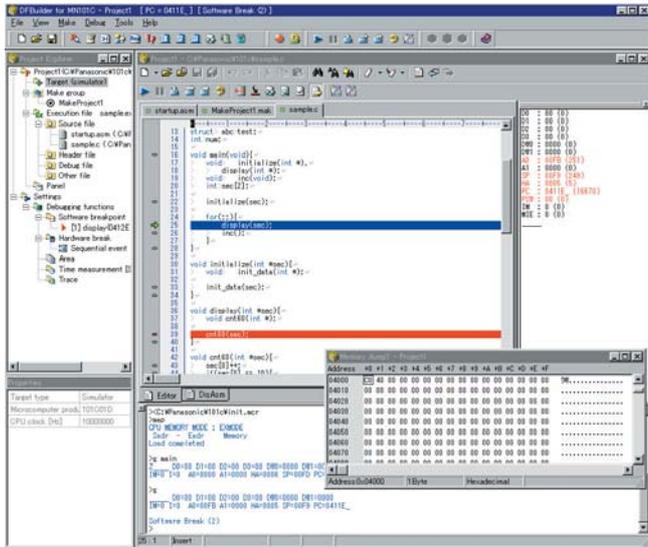


Software Development Environment

Integrated Development Environment (DebugFactory)

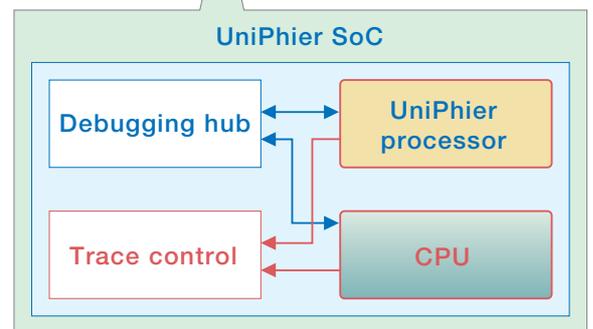
The DebugFactory Builder provides efficient software debugging by supporting, in a single application, the edit, build (make file generation and compilation), and debug sequence that is used repeatedly in debugging.

An on-board instruction set simulator lets you work on developing software while the target hardware is still under development.



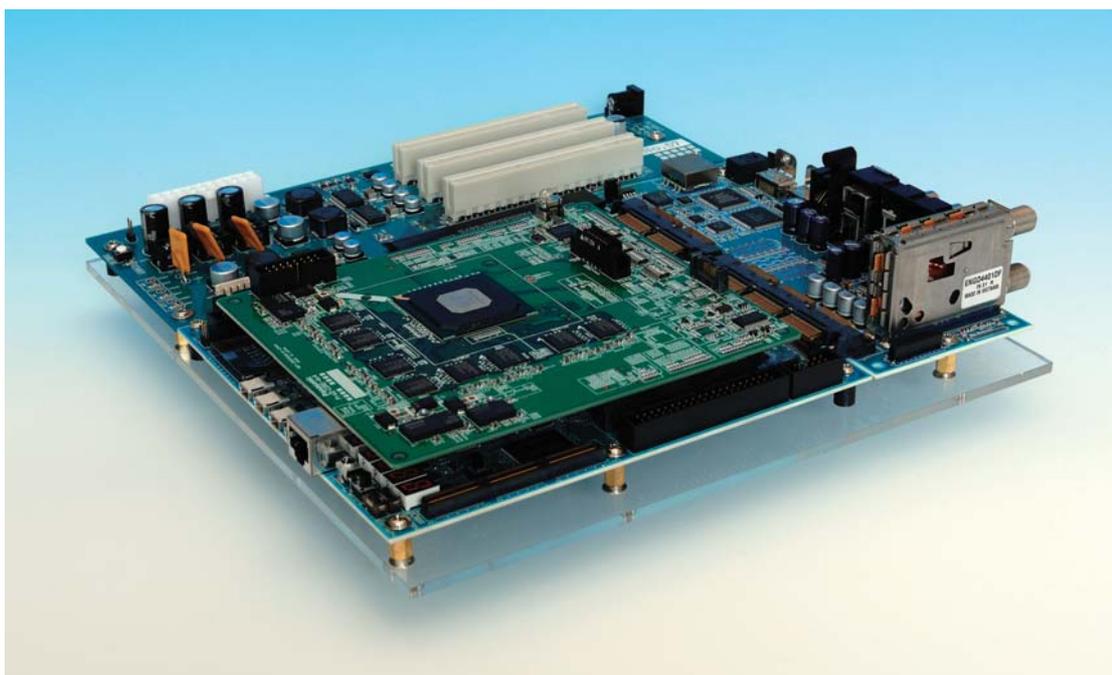
Multi-core On-board Debugger Environment(PanaX NEO)

A multi-core debugging feature allows debugging of both UniPhier processor and CPU code.



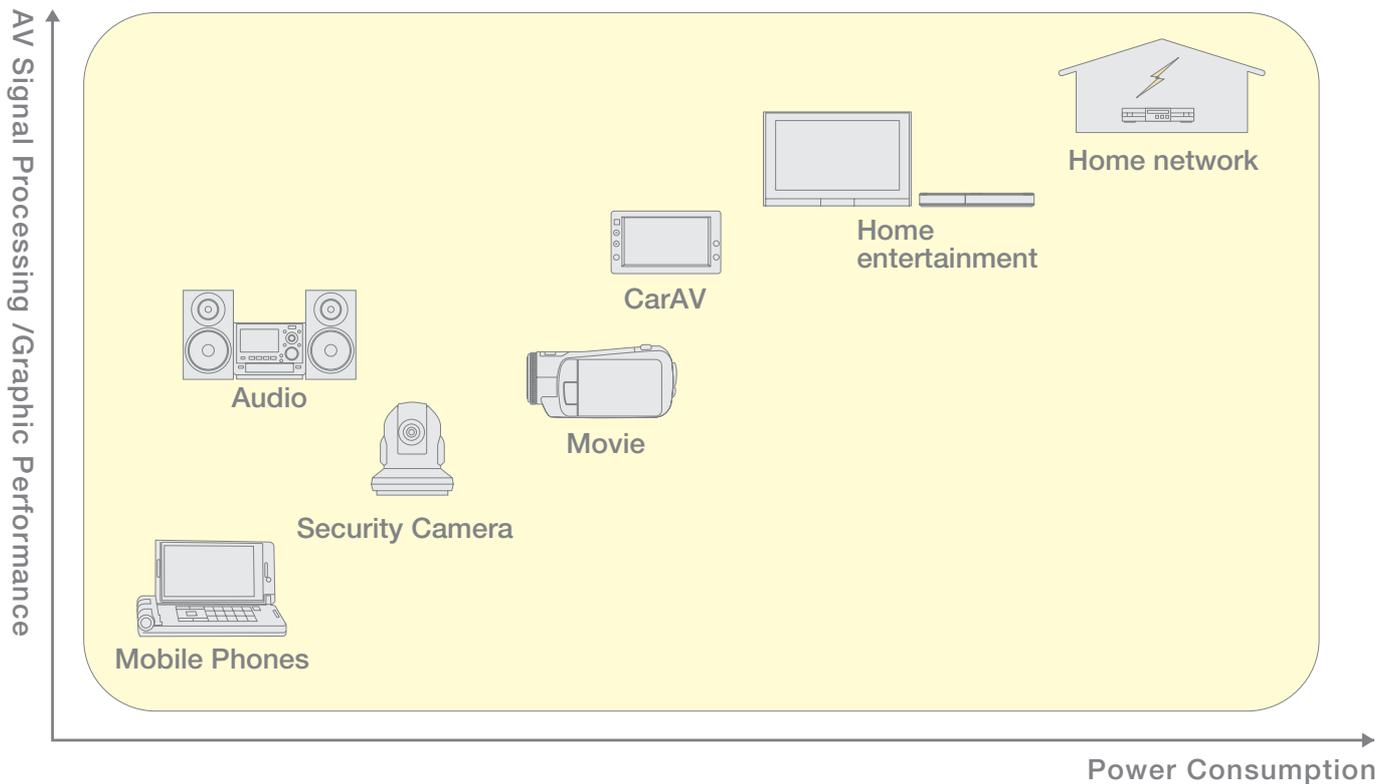
UniPhier Reference Board (Base Technology Package)

At the core of this software development and evaluation reference board is the UniPhier. Designed to run a general-purpose OS (Linux) environment, the board places Panasonic's specialized knowledge in AV technologies and an advanced development environment at your disposal to help in the implementation of hardware projects, making it ideal for use in verifying codec specifications and developing middleware.



Product Applicable Fields

● From low power consumption mobile phones to high-function applications are supported



The Main - Media Processing Library

Sound - Audio

Picture-Multiplex separation

AMR decode	Sound / No Sound Detection	DTS decode	3D-MIDI	JPEG decode
AMR encode	DTMF	DTS-HD decode	AGC	JPEG encode
AMR-WB decode	MPEG2AAC decode	DTSenc	Stereo Emphasis	PNG decode
AMR-WB encode	MPEG2AAC encode	DTStranscoder	Karaoke (Key Control)	GIF decode
G.711 decode	MPEG2AAC-Multi decode	WMA decode	Karaoke (Sound Space)	Color Space Change
G.711 encode	MPEG4AAC decode	WMA Pro Decoder	Level Compression	Enlarge / Reduce
G.726 decode	MPEG4AAC encode	LPCM (QT) decode	Dolby PRO LOGIC	False Field Processing
G.726 encode	MPEG4AAC-Multi decode	LPCM (QT) encode	Dolby PRO LOGIC II	MPEG1 decode
GSM-FR decode	MPEG1A L1 decode	LPCM (SD) decode	Dolby PRO LOGIC IIX	MPEG1 encode
GSM-FR encode	MPEG1A L2 decode	LPCM (DVD-V/SD) encode	Audio Water-Mark (DVD-A)	MPEG2 decode
GSM-HR decode	MPEG1A L2 encode	LPCM (DVD-V) decode	Audio Water-Mark (BD)	MPEG2 encode
GSM-HR encode	MP3 decode (SD Audio)	LPCM (DVD-A) decode	Speech Speed Conversion	MPEG4-SP (H.263) decode
GSM-EFR decode	MP3 encode	LPCM (BD) decode	IEC-Down	MPEG4-SP (H.263) encode
GSM-EFR encode	MPEG2BC L1 decode	PPCM decode	De Emphasis	MPEG4-AVC/H.264 decode
GSM-AMR decode	MPEG2BC L2 decode	MLP decode	Commercial Detection	MPEG4-AVC/H.264 encode
GSM-AMR encode	MPEG2BC L2 encode	CD-DA decode	DC Elimination	VC-1 decode
G.722.1 decode	MPEG2BC L2 Multi decode	CD-DTS decode	SRC (X2·X6)	WMV8/9 decode
G.722.1 encode	MPEG2BC L3 decode (MP3)	ATRAC3 decode	Test Tone	FLV decode
G.723.1 decode	MPEG2BC L3 encode (MP3)	ATRAC3 encode	(OSC, Sweep, White Noise)	DivX decode
G.723.1 encode	AAC+SBR decode	SILK	SRS (TruSurroundXT)	DV decode
G.729 decode	AAC+SBR encode	HDCD	BBE	ASF demultiplexer
G.729 encode	Enhanced AAC+SBR decode V1	TTONE	BBE viva	ASF multiplexer
EFR decode	Enhanced AAC+SBR decode V2	Spectrum Analyzer		MP4 demultiplexer
EFR encode	Enhanced AAC+SBR encode	Graphic Equalizer		MP4 multiplexer
Noise Canceller	AC-3 decode (Down Mix)	XBS		H.223 demultiplexer
Compander	AC-3 decode (5.1ch)	PCM MIX		H.223 multiplexer
Echo Canceller	AC-3 encode (2ch)	Down Mix		MPEG2-PS demultiplexer
Variable-speed Playback	AC-3 encode (5.1ch)	Bass Redirection		MPEG2-PS multiplexer
Equalizer	Dolby Digital+ decode	Delay		MPEG2-TS demultiplexer
	MS10	HP-VSS		MKV demultiplexer
		SP-VSS		1seg-PES→ES

In case of use, the customize is sometimes necessary.

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