

JukeBlox® 2.1

The Most Comprehensive CE Connectivity Platform Available



JukeBlox 2.1 is a hardware and software solution that enables home CE products to connect to the internet and home network, allowing access to internet radio and music services along with home network media. This comprehensive 3rd generation platform leverages seven years of software feature development and architectural evolution along with SMSC's 3rd generation media network processors, modules and hardware designs.

The JukeBlox 2.1 software platform and SDK combines and extends many features from previous SMSC platforms and is now featuring support for AirPlay® music streaming and control feature. JukeBlox provides the broadest and most proven feature set along with SDK development and customization capabilities all optimized with faster boot time and real-time operations. We have also optimized our network media module designs with the new CX series allowing for 25% lower cost and 50% size reduction. This enables smaller and lower cost memory requirements, lower overall solution costs and much smaller product designs. We offer an extensive application stack as well as a comprehensive SDK and tool set to bring you an advanced, powerful, robust and flexible connectivity platform.

Platform Features

- Comprehensive connectivity solutions
 - Processors, modules, software, SDKs, designs
 - Cost-effective, feature-rich Wi-Fi®/Ethernet solutions
- Featuring full support for AirPlay music streaming/control
 - Supports iTunes® streaming and control over home network
 - Supports streaming from iOS devices (iPhone®, iPad®, iPod touch®)
- Unequaled music content and premium services
 - Internet radio with over 10,000 stations
 - Pandora®, Rhapsody®, SiriusXM™, Napster®, Last.fm®, among others
- DLNA® 1.5, uPnP, Win7 interoperability
 - Connect, control, stream from PCs and uPnP devices
 - Interoperable, certified, full DMC and DMR support
- Compelling color UI with icon navigation and album art
 - Rich 3.5" QVGA color display and TV out UI options
- Comprehensive solutions for all applications
 - Embedded/slave and standalone/SOC platforms
- Extensive peripheral options with full hardware and software support
 - AM/FM/RDS, DAB/DAB+/DMB, iPod® with Authentication co-processor support
 - USB 2.0, SD card, clock and alarms
- Powered by SMSC's DM870 network media IC
 - Triple-core processor with integrated Wi-Fi
- Complete Wi-Fi, module subassembly offering
- JB Failsafe - extensive system and firmware upgrade/management
- JB Multi-Zone - whole home audio technology
 - Device discovery, grouping and control
 - Synchronized, multi-zone streaming (party mode)
- JB Connect - SMSC's simplified Wi-Fi network setup technology

Solution Options

In order to significantly accelerate product development as well as deliver a plethora of integrated DMP features, SMSC has combined comprehensive solutions for two classes of products, the **aDMP standalone/SOC** implementation and **eDMP embedded/slave** implementation.

Taking advantage of full networking and DMP features as well as high-value system management and control capabilities, SMSC's software application stack permits rich-customization of user interfaces, enabling rapid development of unique, branded end products by OEMs and ODMs. Reference designs are available.

Solution	Description	Product Applications
eDMP	For Embedded / Slave Implementations <ul style="list-style-type: none">■ Brings DMP capability into existing or complex products■ Provides interface/control protocols and registers for system micro-controller interface and communication■ Supports extensive peripheral (iPod, USB, SD) and system level features (firmware upgrade/management, remote device control, etc.)	A/V receivers, mini-component systems, televisions, speaker bars, CEDIA® style systems, complex radio/audio products
aDMP	For Standalone / SOC Implementations <ul style="list-style-type: none">■ Provides comprehensive DMP, UI and product level features all based on SMSC processors■ Provides I²C and GPIO interfaces for control of a complete standalone product■ Supports extensive DMP and system level features	iPod docks, clock radios, table top radios, mini-systems, media adapters

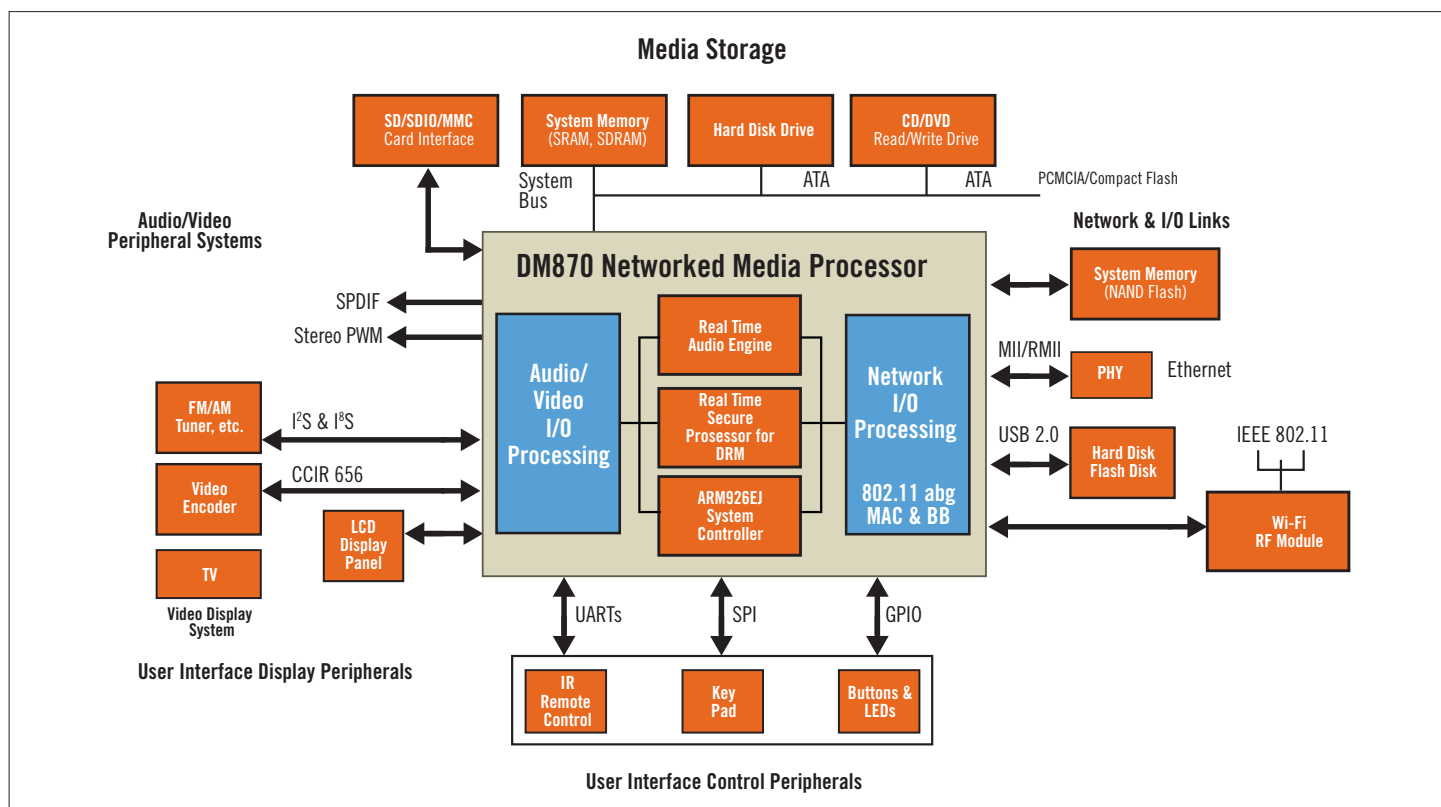
Network Media Processors

With three generations of evolution, our processors have evolved to deliver excellent performance and I/O, featuring a system integration to provide cost-effective, yet powerful feature-rich connectivity for audio-centric products. Based around ARM9 processors, we've developed highly-optimized busses and I/O structures for managing high bit-rate, high-bandwidth digital audio with high-quality as well as low noise and jitter. We've integrated primary interfaces like Ethernet, USB 2.0, S/PDIF, LCD controller, CCIR656 (for TV UI's) and even Wi-Fi MAC/baseband so you can develop low-cost, yet feature-rich products. Our latest generation processors feature a "triple core" architecture that provides over 1000 MIPS of combined processing power and separate proprietary cores for security and audio processing features/capabilities.

Network Media Processors Summary

Product	Processors	Integrated Wi-Fi	Ethernet	LCD	CCIR656	USB2.0	S/PDIF	SD/SDIO
DM870	Triple Core, 3rd Gen <ul style="list-style-type: none"> ARM9-240MHz Security core - 160 MHz Audio engine - 160MHz 	✓	✓	✓	✓	✓	✓	✓
DM860	Triple Core, 3rd Gen <ul style="list-style-type: none"> ARM9-240MHz Security core - 160 MHz Audio engine - 160MHz 		✓	✓	✓	✓	✓	✓

DM870 Processor Functional/Application Overview

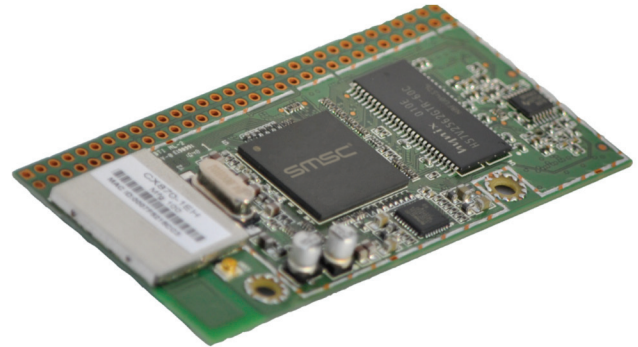


Network Media Modules

The JukeBlox 2.1 platform features an entire DMP (Digital Media Player) system on a miniature PCB. Featured below is our 3rd generation network media module the CX870 series - offering full Wi-Fi pre-certification, FCC compliance and cost-effective memory/feature options in an aggressively sized, cost-reduced solution. Our modules provide a cost-effective approach to bringing all the capabilities of the JukeBlox platform to your system without the complexities and costs of RF design and full compliance certifications. Plus, with our matrix of feature/population options, you can leverage one product design to service an entire product lineup. Leverage our design expertise as well as our aggregated volume to get high value connectivity with low risk and low cost.

Primary CX Series Module Features

- Compact 81.3mm x 40.6mm (3.2" x 1.6")
- Supports full features for both aDMP and eDMP use
- DM870/DM860 media processor versions
- Onboard Ethernet and integrated Wi-Fi options
- Includes SDRAM and Flash memory systems
- Wi-Fi includes low cost on-board PCB antenna option
- Connects with standard header connectors
- Designed with SMSC quality and reliability validation
- Wi-Fi pre-certified, FCC compliant, RoHS compliant

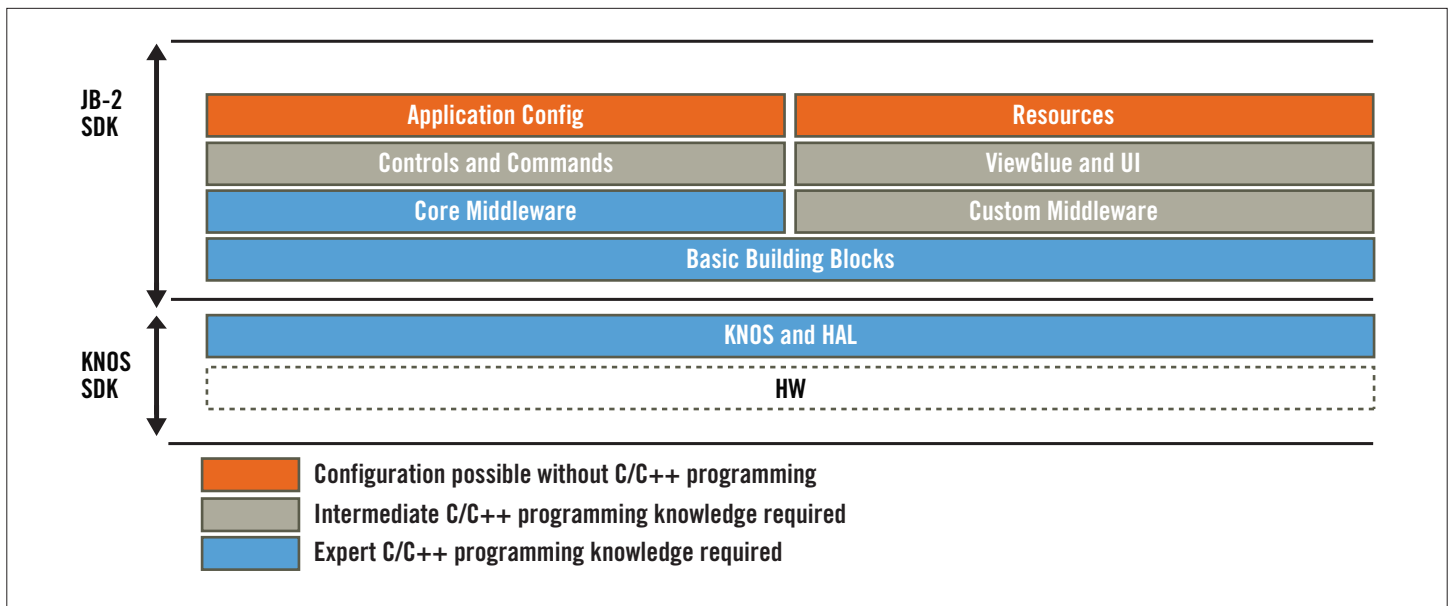


JukeBlox 2.1 Software and SDK

The JukeBlox platform is a comprehensive SDK based Digital Media Player (DMP) software/middleware development platform. It provides low level interfaces and a fast real-time ThreadX-based OS up through an extensive application layer. The platform is architected for digital rights management using a secure co-processor, offering a secure platform that supports current and future authentication and encryption schemes. The JukeBlox platform is compliant with industry standards published by the Digital Living Network Alliance Home (DLNA) and UPnP Forum. Using UPnP automatic discovery mechanisms, it bridges the content stored on the internet, PC or an alternative server device and provides the user interface for browsing entertainment content and metadata available on the network. Based on sophisticated radio station database management an automatically updated list of 10,000+ stations is available. Automatic network management provides easy setup functions on a Wi-Fi network as well as support for Wi-Fi Protected Setup (WPS) implementations. The JukeBlox platform allows the use of a single software configurable platform for both embedded/slave and stand alone/SOC implementations in consumer entertainment products. It provides a variety of software options and customization capabilities to increase the functionality of the product.

The JukeBlox SDK consists of the following elements as shown in the following diagram:

- SMSC core libraries providing common functions for the higher software layers
- Middleware consisting of the player for media decoding, playing, and streaming; browser for content access and navigation; controller for overall system control; UPnP and DLNA stacks and Apple® MFI compatible, WWI compliant protocol stack and control software
- System configuration for easy system-level customizations without programming
- Control and command configuration files for managing and customizing remote control functions
- Resources containing all UI and system resources such as graphics, icons, fonts, language strings
- ViewGlue and UI for the UI look-and-feel



The SDK Framework and API allows for several levels of customization, depending on the need for changes and the expertise of the user. At the simplest level, the configuration tools can be used to recompile the resources, such as text strings in different languages, splash screens, icons, device name, and device parameters, without the need to modify or recompile the binary application code. When more complicated changes are needed, the source code can be changed and recompiling is needed. This can be done at several levels of increasing complexity:

- Enabling/disabling modules and features
- Modifying UI behavior of the application layer
- Modifying source code of the core functions (eg: GPIO control, additional remote control registers, etc.)

Summary of Features

Networking and Content Discovery

- UPnP AV 1.0
 - Media server control point
 - Media renderer
- Wireless 802.11b/g networking
- WEP, WPA, WPA2 and Wi-Fi compliant
- Wi-Fi Protected Setup (WPS) support
- Network site survey (SSID) and selection
- 10/100 base-T wired Ethernet
- Automatic switching between AutoIP and DHCP
- Multiple user-defined network profiles
- USB storage device
- Real-time browsing of 10,000+ radio stations

Audio Support

- MP3, WMA, LPCM, WAV, AAC, AAC+
- Ogg Vorbis, FLAC, FLAC HD
- AM/FM Tuner (with or without RDS)
- Multi-channel support
- 32-96 kHz, with 16, 24, or 32 bit output
- SPDIF outputs

Playlists

- PLS, M3U, ASX

Server Interoperability

- Any DLNA 1.0/1.5 compliant server
- UPnP AV 1.0 media server

Summary of Features (continued)

Premium Content Services

- Rhapsody DNA
- Pandora
- vTuner Internet Radio with OEM-branded Portal
- Napster
- Last.fm
- SiriusXM

JB Multi-Zone Technology

- Unique whole home audio features
- Device discovery, grouping and control
- Synchronized, multi-zone streaming (party mode)

Digital Rights Management

- Windows Media® DRM10
- Rhapsody Radea DRM
- Pandora DRM

International Language Support

- Display technology for western European and Asian languages (UTF8)

User Interface

- Clock with alarm clock with multiple alarms
- Favorites/Tag list
- Recently played list
- IR remote control

System Management

- Software upgrade direct from internet
- Web interface for device management
- Auto network discovery and configuration
- Installation wizard for ease of product setup
- NTP and RDS time synchronization

Industry Standards

- Wi-Fi Alliance
- DLNA (Digital Living Network Alliance)
- UPnP (Universal Plug and Play)
- Full DMC and DMR support
- Win7 certified

JB Technologies

- JB Connect - simple Wi-Fi setup
- JB Failsafe - safe system code updates
- JB Green - special low power modes
- JB Multi-Zone - whole home audio

System Components

Controller

Event dispatcher for all input and internal status events, translating them into internal commands and application status transitions (modes, like play mode, browse mode, error mode, etc.)

Player

Renders individual tracks (includes acquiring the data over the selected communication interface, decoding, effect handling, playing out)

Content Browser

Provides access to content directories (e.g., UPnP, File System, Music Services, etc.)

Software Development Tool Suite

Bootloaders

- 1st level bootloader (SMSC) binary file
- 2nd level bootloader (RedBoot™) binary file

GNU-based Development Tools

- Cross compilation tool chain for DM870 (GCC)

SDK Tools

- JRE distribution for media resource compilation
- RedBoot
- RedBoot sources
- DM870 specific drivers (Ethernet, Wi-Fi, UART)

Build Tools Required (customer provided)

- RVDS 2.2 (or higher - 3.1 recommended) along with ARM license
- Microsoft Visual Studio® 2005 (or later version)
- Visual MaX 0.37t
- SMSC ToolChain 2.2.1.2
- Perl 5.10.0
- Python 2.6.2.2
- Microsoft Java Virtual Machine [msjvax86]

The JukeBlox Development and Evaluation Kit

The JukeBlox development hardware platform, the “CE-2” board, consists of the optimized DM870 core-module and a CE-2 base board that includes virtually every option for supporting the complete JukeBlox feature set. The following diagram shows the EVM CE-2 hardware platform that will be included in the SDK kit and our evaluation packages. The on-board QVGA color display and the many I/O options provide a superset of capabilities that supports almost any product application. SMSC will also provide the EVM CE-2 associated schematics, layout and Gerber files to aid in the development of customer projects.



CE-2 Hardware Features

- DM870 Media Processor in 292 mBGA
- Certified core module with DM870 and integrated Wi-Fi
- Supports development of aDMP or eDMP implementation
- Ethernet port
- QVGA color LCD display
- Color TV out UI support – composite, S-Video, NTSC/PAL
- S/PDIF out support (directly supported in DM870)
- Analog audio out – line level RCA, headphone mini-jack
- iPod support thru iPod connector or USB (with Auth. CP)
- I/O media ports: USB2.0 HS, SDCard, IDE
- AM/FM/RDS daughter board
- IR remote sensor
- RS-232 serial port (for development interface)
- Board size: 170mm x 174mm (6.7" x 6.8")