

# Java™ Technology for the Wireless Industry (JTWI)

Enabling end-to-end solutions for mobile phones.



## Key feature highlights

- Builds on the success of the Connected Limited Device Configuration (CLDC) and Mobile Information Device Profile (MIDP)
- Defined by some of the world's largest handset manufacturers and mobile operators
- Specifies the standard application environment for Java™ technology-enabled mobile phones

The success of the Connected Limited Device Configuration (CLDC) and Mobile Information Device Profile (MIDP) in the mobile phone market, followed by the definition of an increasing number of optional sets of Java™ APIs, has prompted a group composed of some of the world's largest handset manufacturers and mobile operators to collaborate and agree on a new standard for Java technology-enabled mobile phones. The goal of this effort is to deliver a predictable environment for application developers, along with a deliverable set of targets for device manufacturers. And by choosing to meet this specification, manufacturers will benefit from a broad range of compatible applications. By creating products for this application environment, software developers will benefit by having a broad range of devices to support their applications.

The Java Technology for the Wireless Industry (JTWI) specification — Java Specification Request (JSR) 185 — defines this new Java application environment for mobile phones. The specification raises the bar of functionality for high-volume devices, while minimizing API fragmentation and broadening the already substantial base of applications that have been developed for mobile phones.

The following deliverables are available as part of JSR 185:

- A roadmap of mobile phone-related JSRs, and descriptions of their availability in various markets around the world.
- A specification describing the essential client components of a mobile phone application environment and the recommended combinations of Java 2 Platform, Micro Edition (J2ME™) technologies. These requirements are designed to enhance end-to-end compatibility.
- An integrated Reference Implementation and Technology Compatibility Kit (TCK) for the technologies described in the specification.

## Functionality and Mandatory JSRs

The goal of the JTWI specification is to clarify how the various technologies associated with the CLDC and MIDP specifications work together to form a complete Java application environment that enables the deployment of end-to-end solutions on mobile phones and other mobile information devices. The initial JTWI specification (JSR 185) defines a Java application environment for mobile devices based on the CLDC 1.0 (JSR 30), MIDP 2.0 (JSR 118), and WMA 1.1 (JSR 120), as well as the CLDC 1.1 (JSR 139) and MMAPI (JSR 135) specifications where applicable. Subsequent versions of the JTWI roadmap and specification will incorporate other technologies defined through the Java Community Process<sup>SM</sup> program.

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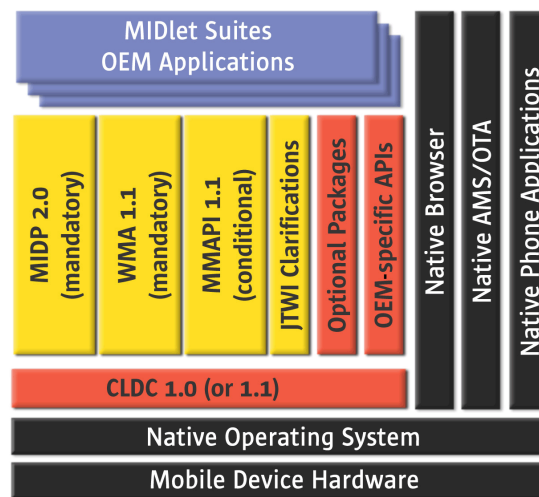


Figure 1: JTWI Components Within a Mobile Phone Software Stack

*JSR 30 CLDC 1.0 (Mandatory)*

The JTWI specification is designed to be implemented on top of CLDC 1.0, which provides basic APIs and the virtual machine. Other configurations that provide compatible APIs, including CLDC 1.1, can also be used.

CLDC is based on a virtual machine designed from the ground up with the constraints of inexpensive mobile devices in mind. It is suitable for devices that have 16- to 32-bit RISC/CISC microprocessors/controllers and as little as 160 KB of total memory available for the Java technology stack. CLDC 1.0 provides core technology for the Java platform runtime and libraries, which are used as the basis for one or more profiles, such as MIDP. For more information about CLDC, please visit [java.sun.com/products/cldc](http://java.sun.com/products/cldc).

JSR 185 includes the following CLDC-related clarifications:

- Support a minimum of 10 application-created threads.
- Minimum clock resolution: JSR 185-compliant implementations must record the elapsed time in increments not to exceed 40 milliseconds.
- Permit the use of custom time zones that adhere to the GMT time zone format.
- Support character properties and case conversions for characters in the Basic Latin and Latin-1 Supplement blocks of Unicode 3.0.

*JSR 118 MIDP 2.0 (Mandatory)*

MIDP provides core application functionality required by mobile applications — including the user interface, network connectivity, local data storage, and application life cycle management — packaged as a standardized set of Java APIs. More information about MIDP can be found at [java.sun.com/products/midp](http://java.sun.com/products/midp).

A JSR 185-compliant implementation may include any optional function of the MIDP specification, but some optional elements of MIDP 2.0 are mandated by the JTWI specification.

The JTWI specification substantially clarifies a number of sections of the MIDP specification, reducing the incompatibilities and variations between implementations that developers may overcome by decreasing the number of optional functions allowed by MIDP 2.0.

JSR 185 includes the following MIDP-related clarifications:

- Should allow MIDlet Java Archive (JAR) files of up to 64 KB, with Java Application Descriptor (JAD) files up to 5 KB. Each MIDlet suite should be allowed to use up to 30 KB of persistent storage, while correctly formed MIDlet suites should include an indication of the minimum amount of persistent storage needed to function.
- Heap (the amount of memory that is available to a running application) should be at least 256 KB.
- Should support screen sizes of 125x125 pixels with 12-bit color depth.

- Should provide mandatory support for tickers, for example, the ability to wake MIDlets up at specific times.
- Support mechanisms for selecting a phone number from the device phone book.
- Support JPEG and PNG image file formats.
- Media content types must be accessible using the HTTP 1.1 protocol.

*JSR 120 WMA 1.1 (Mandatory)*

Wireless messaging is a key service that can be used by games, business applications, and commerce application communications by providing simple, low-cost mechanisms. The Wireless Messaging API (WMA) is an optional package for the J2ME platform that provides platform-independent access to wireless communication resources. The WMA Reference Implementation 1.1 is targeted at devices featuring a compliant MIDP 2.0 implementation.

WMA enables application developers to build intelligent, connected Java technology-based applications that send and receive short messages, and provides access to network-specific Short Message Service messaging on Global System for Mobile Communications (GSM) or Code Division Multiple Access (CDMA) networks. More information about WMA can be found at [java.sun.com/products/wma](http://java.sun.com/products/wma).

The JSR 185 specification includes the following WMA-related clarifications:

- Devices on GSM/Universal Mobile Telephone System (UMTS) networks must make Short Message Service (SMS) text messaging available via WMA.
- Support for SMS Push, which is the ability of the device to launch a MIDlet in response to an incoming SMS message.
- Access to GSM Cell Broadcast via Java APIs must follow the WMA 1.1 specification.

**Conditionally Required JSRs**

If a device implementing JSR 185 includes specific features that are exposed through Java APIs, it must support these conditionally required JSRs.

*JSR 135 MMAPI 1.1 (Conditional)*

A JSR 185-compliant device must implement Mobile Media API (MMAPI) support for media services that are exposed through Java APIs. MMAPI enables an application to playback and record various time-based media, providing for rich user interface features, more compelling games, and new types of content. It also extends the functionality of the J2ME platform by providing audio, video, and other time-based multimedia support to resource-constrained devices. As a simple and lightweight optional package, MMAPI enables application developers to gain access to native multimedia services available on a given device. More information about MMAPI can be found at [java.sun.com/products/mmapi](http://java.sun.com/products/mmapi).

The JSR 185 specification introduces the following MMAPI-related clarifications:

- Support both Musical Instrument Digital Interface (MIDI) content and tone sequence content. MIDI support makes powerful and rich audio capabilities available to developers, using relatively small files.
- Support HTTP 1.1 for media file download in all supported media formats.
- Support 8-bit, 8-kHz mono PCM WAV format for audio capture, and JPEG for video snapshots. Devices are free to support other formats as appropriate, but the required formats give developers a baseline of expected behavior.

## Java™ Technology for the Wireless Industry (JTWI)

### JSR 139 CLDC 1.1 (Conditional)

A strict superset of CLDC 1.0, CLDC 1.1 includes floating point support as well as weak references (valuable in memory-constrained environments) and improved date handling, plus minor additions and clarifications at minimum additional overhead. In some instances, CLDC 1.1 may be used instead of CLDC 1.0 in JTWI implementations. In particular, if floating point capabilities are exposed through Java APIs, the JSR 185 specification requires that CLDC 1.1 or another compatible J2ME configuration must be implemented. The JSR 139 specification is likely to become mandatory in subsequent releases of the specification.

### Security Policy

The JSR 185 specification introduces a number of clarifications for untrusted applications with regard to the “Recommended Security Policy for GSM/UMTS-Compliant Devices” defined in the MIDP 2.0 specification. It extends the base MIDlet suite security framework defined in MIDP 2.0, and defines the following areas:

- Required trust model for GSM/UMTS compliant devices.
- Capabilities of MIDlets based on permissions defined by the MIDP 2.0 and other JCP™ specifications.
- Utilization of user permission types.
- Guidelines on user prompts and notifications.

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### For More Information

To learn more about the JTWI specification, please visit [java.sun.com/products/jtwi](http://java.sun.com/products/jtwi). To read the full text of the JTWI JSR proposal, please visit [jcp.org/jsr/detail/185.jsp](http://jcp.org/jsr/detail/185.jsp). The initial version of the JTWI roadmap is available at [jcp.org/aboutJava/communityprocess/jsr/JSR185\\_roadmap.pdf](http://jcp.org/aboutJava/communityprocess/jsr/JSR185_roadmap.pdf). To learn more about the J2ME platform, visit [java.sun.com/j2me](http://java.sun.com/j2me).

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