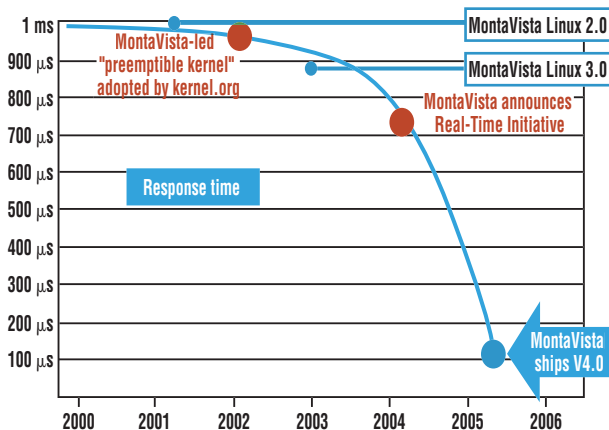


# Linux Goes Real-Time All By Itself



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**R**eal-time Linux is critical to the mobile handset and telecommunications markets. Over the past five years, the standard Linux kernel has made significant gains in delivering better real-time performance (see the fig-



Linux has made some significant real-time improvements over the past five years.

## Multitasking Java Virtual Machine Runs Mobile Handsets

**MORE HANDSET DESIGNERS ARE CHOOSING JAVA** because of its portability, security, and ability to optimize resource utilization. Esmertec's  $\mu$ @PoC Push-To-Talk over Cellular Client for 2.5G and 3G mobile devices is just one aspect of this adoption.

The client brings walkie-talkie-style communication to mobile devices. It complies with the Open Mobile Alliance (OMA) PoC specification. (OMA strives to deliver open technical specifications designed to support mobile operators, devices, and network suppliers.) The key features of  $\mu$ @PoC include easy group creation, group-talk organization, fast retrieval of contacts from the phonebook, and access to participants' availability.

The client is built on Esmertec's Jbed Advanced multitasking Java virtual machine (JVM). The multitasking JVM is compatible with the Java 2 Platform, Micro Edition (J2ME). It supports the Connected Limited Device Configuration (CLDC), the Mobile Information Device Profile (MIDP), and the Java Application Management System (AMS).

A multitasking JVM lets network operators download and immediately use bug fixes, new applications, and new services. The JVM also provides real-time processing support.

**Esmertec** • [www.esmertec.com](http://www.esmertec.com)

**Open Mobile Alliance** • [www.openmobilealliance.org](http://www.openmobilealliance.org)

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ure). At the turn of the century, average interrupt latency was on the order of 1 ms. Now, it's approaching 100  $\mu$ s.

MontaVista's changes enhance stock versions of Linux, compared to the subkernel approach used in FSMLabs' RTLinux. The RTLinux real-time platform already provides a deterministic execution environment. It was easier to limit interrupt disabling in a smaller subkernel designed for real-time operation.

MontaVista has reduced the number of places in the stock Linux kernel where interrupts are disabled by two orders of magnitude, leaving only

about 100 critical regions where interrupts must be disabled. With the changes, a typical 300-MHz 32-bit processor has a worst-case interrupt disable latency on the order of 180  $\mu$ s.

Kevin Morgan, MontaVista's VP of Engineering, says this may be cut by an order of magnitude next year as additional changes are made to bring standard Linux in line with other real-time operating systems. Linux does not have to hit the hardware performance limit to be suitable for over 95% of all real-time applications. Right now, it can handle a wide range of real-time applications.

**MontaVista**

[www.mvista.com](http://www.mvista.com)

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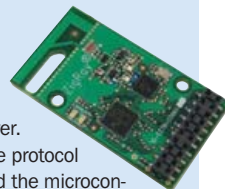
## WIRELESS PRODUCTS

### Module Simplifies ZigBee Support

The ZigRay Wireless Data Transceiver module from Tecnova is a small-footprint pc board that incorporates a Freescale MC9S08GT60 microcontroller with an MC13192/3 ZigBee transceiver.

The module is available with or without a ZigBee protocol stack. The wireless data rate is 250 kbits/s, and the microcontroller interface is 19.2 kbits/s serial. Eight data lines and four 10-bit analog-to-digital converter connections from the microcontroller are available. Pricing for the transceiver starts at \$50, or \$35 in OEM quantities. The communications module costs \$275.

[www.tecnova.com](http://www.tecnova.com)



### PC/104-Plus Module Hosts 802.11b/g

The PPM-Wireless is a PC/104-Plus compliant module from WinSystems. It's designed to add 802.11b or 802.11g wireless networking to a PC/104-Plus system. The board's MiniPCI connector accepts a wireless MiniPCI card like Intel's PRO/Wireless 2200BG Mini-PCI card. A surface-mounted assembly external connector provides support for an external antenna. PPM-Wireless pricing starts at \$149.

[www.winsystems.com](http://www.winsystems.com)



### ZigBee Transceiver Mends With MCU

Freescale's MC1320X family includes three pin-compatible standalone 2.4-GHz RF transceivers with an integrated Tx/Rx switch designed to mesh with with Freescale's HCS08, HC12, Coldfire, and DSC processors. Integrated versions will use Freescale's low-voltage, low-power HCS08 core with embedded flash memory and peripherals, such as 10-bit analog-to-digital converters, and low-voltage/brownout and keyboard interrupts. The chips will run Freescale's wireless Z-stack. The stack initially will support proprietary point-to-point and simple ZigBee star networking. Pricing will start at \$2.35.

[www.freescale.com](http://www.freescale.com)

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