# Embedded Software Essentials

*C Standardization and Team Coding Standards*

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# Standards

Standards Organizations

- International Electrical and Electronics Engineers (IEEE)

- International Organization for Standardization (ISO)

- American National Standards Institute (ANSI)

# C-Programming Standards

- Programming languages evolve over time

- Standards provide specific syntax and features what each version of the language supports

- C-Programming Standards:
  - K&R C-Programming: Late 1970's
    - Informal Standard
  - C89 (ANSI-C) / C90 (ISO-C)
  - C99
  - C11

# C-Programming Coding Guidelines

- Rules developers adhere to in order to make changes to code

- C-Programming Guidelines:
  - MISRA C Coding Guideline
    - Motor Industry Software Reliability Association
  - Ganssle's "Firmware Development Standard"

- Can help with:
  - Preventing bugs
  - Reducing Bad Practices
  - Ensuring security, portability,  reliability and safety of software

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# Cisco Lawsuit

**Cisco had to release their firmware/software for violating a copyright**

## Cisco sued by Free Software Foundation for copyright infringement

FSF alleges Cisco's Linksys products violated its software licenses

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By Linda Leung

The Free Software Foundation Thursday slapped Cisco with a lawsuit claiming copyright infringement related to Cisco's Linksys wireless routers.

The FSF alleges that "in the course of distributing various products under the Linksys brand, Cisco has violated the licenses of many programs on which the FSF holds copyright, including GCC, binutils, and the GNU C Library." Cisco has denied its users their right to share and modify the software as a result, the FSF adds.

FSF Licensing Compliance Engineer Brett Smith writing in his blog said the FSF in 2003 learned that the Linksys WRT54G wireless router used a GNU/Linux system in its firmware, "but customers weren't receiving all the source code they were entitled to under our licenses."

Smith adds that the FSF began working with Cisco in 2003 to help the company establish a process for complying with FSF's software licenses. It also emerged that other Cisco products were not in full compliance either, according to Smith, who described the FSF's five-year effort to get Cisco compliant as a "running game of Whack-a-Mole."