

Embedded USB Device Stack

Industrial-grade, standard-compliant USB device software solution

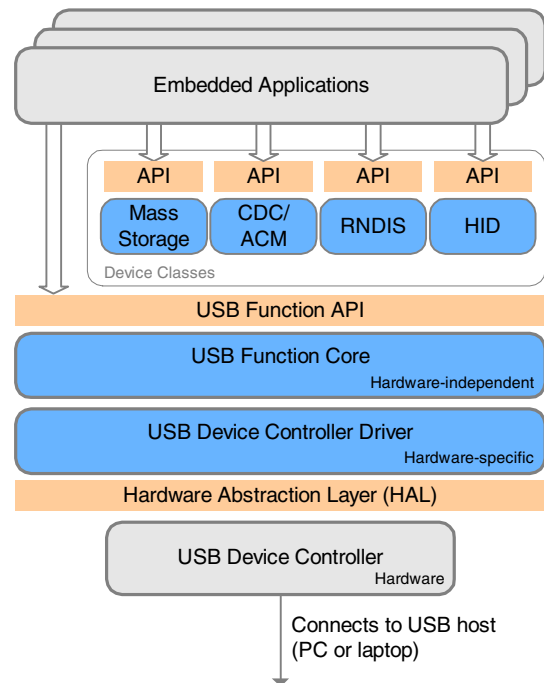
TheSycon's Embedded USB Device Stack implements the core functionality of a USB device and optionally provides device class specific protocols. It enables developers to easily add USB device functionality to embedded systems.

The software stack supports all transfer modes (control, bulk, interrupt, isochronous) at full and high speed. Extended error recovery mechanisms as required for reliable operation are implemented internally.

The modular design allows to implement proprietary USB interfaces and standard device classes. The creation of composite devices which implement multiple logical functions on one physical controller as well as multi-configuration devices are fully supported.

Device class specific APIs provide a high abstraction level and are easy to use. No USB know-how is required.

Using TheSycon's [USB bootloader](#) package helps in implementing firmware upgrade functionality for embedded systems.



Device Classes

The **CDC/ACM** protocol module implements a standard-compliant serial link (RS-232) emulation on top of USB. TheSycon also offers an appropriate device driver for Windows operating systems.

The **RNDIS** module implements an Ethernet emulation on top of USB. This approach is especially useful if an embedded system contains a TCP/IP protocol implementation.

The **Mass Storage** protocol module emulates a disc drive with FAT or CD-ROM file system. It can be used to create a CD-less PC software installation, or to exchange static data files between the device and the PC.

The **HID** module implements a generic HID device (Human Interface Device). The device uses the in-box HID class driver.

Further device classes can be created on request.

Platform Integration

The Embedded USB Device Stack is written in ANSI C. For easy integration the software is designed as a library and provided as source code. The library does not depend on any specific operating system support. It can be integrated into any embedded OS, or can be used in stand-alone applications.

Platform Source Code License

A device stack license includes the full source code and allows royalty-free distribution of binaries compiled from the sources. Distribution of source code is not permitted. For complete license conditions and prices please contact TheSycon.

Supported Controllers

- ❑ **NXP** ARM Cortex-M3 core, LPC23xx, LPC24xx, LPC28xx, LPC31xx, LPC32xx
- ❑ **Atmel** ARM Cortex-M3 core, AT91SAM7, AT91SAM9 families (ARM)
- ❑ **Atmel** AT32 family (AVR32)
- ❑ **Renesas** H8S/H8SX, M16C/6C families
- ❑ **ST Microelectronics** STR9xx based family

Other device controller drivers can be created on request. For the latest list of supported platforms, check out <http://www.thesycon.com/embusbdevice>

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Software solutions utilizing the Embedded USB Device Stack

The modular concept enables the Embedded USB Device Stack and its device classes to be integrated in a wide range of application scenarios. Bellow common application scenarios are shown with respect to the involved modules of the Embedded USB Device Stack and the appropriate PC device drivers.

Raw bulk

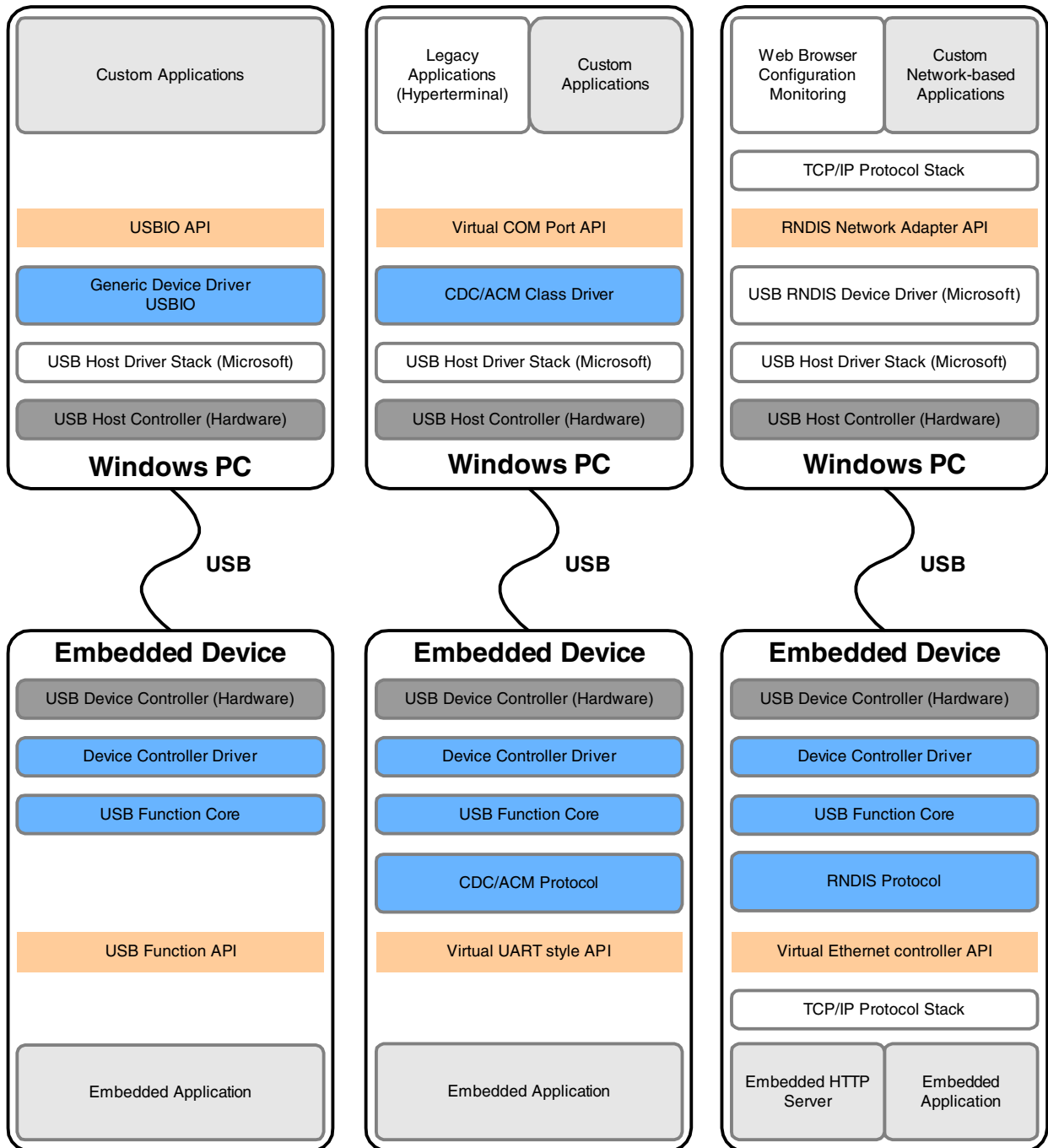
USB device functionality in embedded systems by using raw USB bulk mode and implementing a vendor-specific protocol.

RS-232 over USB

Standard-compliant serial link (RS-232) emulation on top of USB implementing the CDC/ACM protocol.

Ethernet over USB

Ethernet emulation on top of USB implementing the RNDIS protocol.



- Provided by Thesycon
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