RFC 213 - Serial Device Service

Draft

29 Pages

~~*Set the release level by selecting one from: Draft, Final Draft, Release.*~~

Abstract

This document defines the Java API to communicate with Serial devices on the OSGi platform. ~~Moreover this RFC defines additional specifications for USB-Serial dongles.~~

0 Document Information

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0.3 Feedback

This document can be downloaded from the OSGi Alliance design repository at https://github.com/osgi/design The public can provide feedback about this document by opening a bug at https://www.osgi.org/bugzilla/.

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0.5 Terminology and Document Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY" and "OPTIONAL" in this document are to be interpreted as described in 1.

```
Source code is shown in this typeface.
```

0.6 Revision History

The last named individual in this history is currently responsible for this document.

Revision	Date	Comments
Initial	August 22, 2014	Initial version Yukio Koike, NTT Corporation, koike.yukio@lab.ntt.co.jp
v0.2	August 26, 2014	Revised version Yukio Koike, NTT Corporation, koike.yukio@lab.ntt.co.jp
v0.3	August 26, 2014	Added the RFC number Yukio Koike, NTT Corporation, koike.yukio@lab.ntt.co.jp
v0.4	Sept. 10, 2014	- Modified based on ML comments - Edited some parts Yukio Koike, NTT Corporation, koike.yukio@lab.ntt.co.jp
v0.5	Nov. 6, 2014	- Removed USB properties - Changed design based on ML discussion Yukio Koike, NTT Corporation, koike.yukio@lab.ntt.co.jp

1 Introduction

OSGi Device Access Specification defines a unified and sophisticated way to handle devices attached to residential gateways or devices found in the home network by using various protocols such as USB, Zigbee, ZWave, KNX, and UPnP etc. OSGi Device Access Specification clearly declares that Device Category must be defined outside of OSGi Device Access Specification.

Recently, OSGi is gaining popularity as an enabling technology for building embedded system in residential market. It is expected that USB devices attached to residential gateways on OSGi has been processed since USB interfaces have been introduced into such gateways.

2 Application Domain

Currently there are several standardization bodies such as OSGi Alliance, HGI, and BBF which deal with the deployment of services in an infrastructure based on the usage of residential gateways running OSGi as Execution Platform.

In order to realize the services which access not only IP devices but also non-IP devices connected to the residential gateway, various protocols for home networks, such as ZigBee, Z-Wave, KNX/EHS, and ECHONET-LITE etc, have to be properly taken care of. While some residential gateways originally support those protocols, others do not. Such issue can be solved when such gateways can support USB interfaces and there exist USB dongles which support those protocols. As shown in Fig. 1, the residential gateway with USB dongles can handle various protocols by the way of “add-on”. The point is that such USB dongles can be usually controlled through Serial Communication.

The existing OSGi specifications which address related topics are:

- Device Access Specification - focuses on the dynamic discovery of the proper driver when a new device is attached/connected to the residential gateway

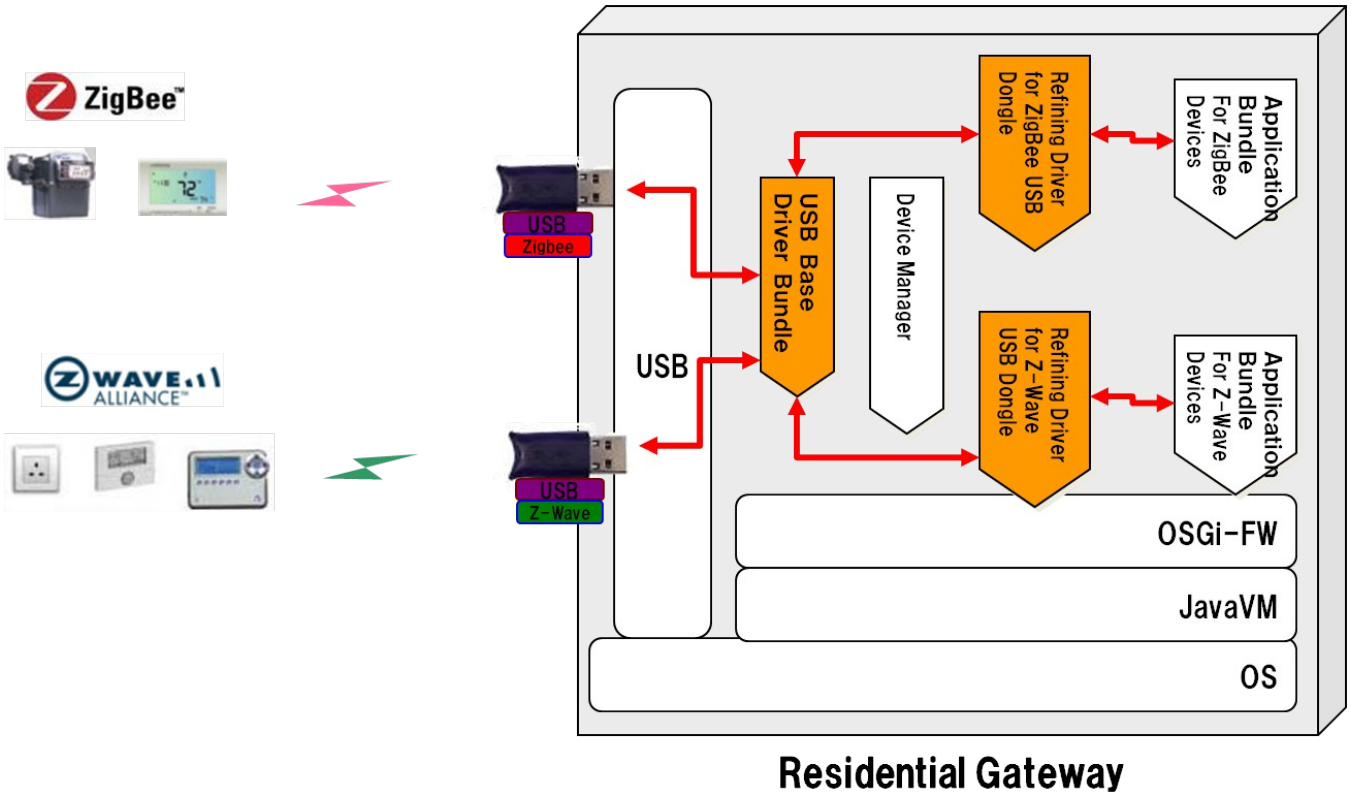

Fig 1 USB Dongles and Residential gateway

2.1 Terminology + Abbreviations

- Base Drivers: see "103.4.2.1" in OSGi Device Access Specification [3].
- Refining Drivers: see "103.4.2.2" in OSGi Device Access Specification [3].
- Match value: the value match() method of a Driver service registered by the refining driver bundle returns. Matching is explained in "103.7.2 The Device Attachment Algorithm" in OSGi Device Access Specification [3].
- Device Descriptor: see "9.6.1" in Universal Serial Bus Specification[4].

3 Problem Description

The existing OSGi Device Access Specification provides the unified way to installation and activation of driver bundles. However, the OSGi Device Access Specification declares the device category for specific devices must be defined outside of itself. Currently, no device category for USB devices has been defined yet.

The lack of the device category for USB devices causes the following problems.

[Problem 1] The developer of a refining driver bundle, which registers a Driver service at its activation, cannot design and implement Driver#attach(ServiceReference) method without knowledge of service properties set to the Device service registered by a USB base driver.

[Problem 2] The developer of a refining driver bundle, which registers a Driver service at its activation, cannot design and implement Driver#match(ServiceReference) method without knowledge of service properties set to the Device service registered by a USB base driver and without the definition of match values to be returned.

In other words, without the device category for USB devices, a refining driver bundle developed by developer A can cooperate with the USB base driver bundle developed by the same developer A but cannot cooperate with the USB base driver bundles developed by the different developer B.

4 Requirements

[REQ_1] The solution MUST be compatible with OSGi Device Access Specification.

[REQ_2] The solution MUST define the details of the registration of a Device service by a USB base driver bundle when a USB device is attached.

[REQ_2-1] The solution MUST define the service interface under which the Device service is registered.

[REQ_2-2] The solution MUST define the service properties with which the Device service is registered: A set of service properties, their data types, and semantics, each of which must be declared as either MANDATORY or OPTIONAL.

[REQ_3] The solution MUST define the way how a driver bundle controls an attached USB device which can be controlled through Serial communication.

[REQ_4] The solution MAY define a range of match values specific to this device category.

[REQ_5] The range of match values MUST be sufficient to describe the required range of native serial drivers specified by the HGI, especially the following ones:

– Class drivers for Human Interface Device (HID) and Communications Device Class (CDC) [1]

– Drivers for FTDI Virtual Com Ports with a variable list of supported USB Vendor Identifiers and Product Identifiers[2].

– Drivers for Silicon Labs CP210x USB to UART bridge and CP2110 HID USB to UART bridge[3].

– USB drivers for Prolific PL-2303 USB to Serial Bridge Controller[4].

5 Technical Solution

5.1 Introduction

RFP 149 “USB Device Category” describes the requirements regarding what to be defined as an OSGi Specification when handling USB devices with OSGi. Among various use cases described in this RFP, we would like to focus on such a typical use case as USB-Serial dongle that can be controlled through Serial Communication.

Such communication can be implemented by means of serial connection when using non-IP devices based on ZigBee and Z-wave protocols. The most typical case arises when a USB dongle that supports such protocols is connected to the USB port in the devices such as residential gateways. OS on the gateways will recognize the dongle as a virtual serial device, and initiate a serial communication with the application process.

In order to realize such a case on OSGi platform, this RFC defines a device category and a service for Serial devices. ~~Moreover this RFC defines additional specifications for USB-Serial dongles.~~ This document explains specifications required for establishing communication between OSGi bundle and serial devices.

RFC 202 “USB Information Device Category” defines a device category for USB devices. Therefore RFC 202 and this RFC are the solution for RFP 149.

1 http://www.usb.org/developers/devclass_docs#approved for details of USB device classes

2 http://www.ftdichip.com/Drivers/VCP.htm

3 http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx.

4 http://www.prolific.com.tw

5.2 Entities

- SerialDevice: This is an OSGi service that is used to represent a serial device. This OSGi service stores information regarding serial device and its status as a service property and provides communication function with the device ~~as a SerialConnection. Refining driver bundles can obtain a SerialConnection instance from the SerialDevice service.~~
- ~~SerialConnection: This is an interface to represent communication with a serial device. Only the refining driver bundles that acquire and maintain this instance can communicate with the serial device.~~
- Serial base driver bundle: The bundle that implements SerialDevice ~~and SerialConnection~~. Serial base driver bundle registers SerialDevice services with the Framework. It provides communication function with the (physical) serial devices. Serial base driver bundle implements concurrently ServiceFactory to access control.
- Refining driver bundle: Refining drivers provide a refined view of a physical device that is already represented by another Device service registered with the Framework (see the details for Device Access Specification).

Figure 2 shows a class diagram of Serial Device Service.

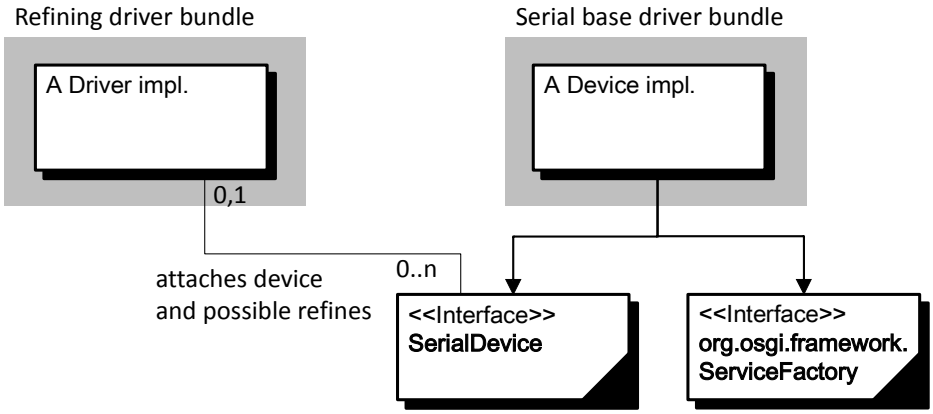

Fig 2: Serial Device Service class diagram

5.3 Assumptions

When a serial device is connected to the gateway, it is mapped to a COM port automatically by native libraries in OS. Those libraries are installed.

5.4 Operation Summary

5.4.1 Serial base driver bundle

A Serial base driver is tracking OS events. Native device driver such as kernel modules in Linux can detect a serial device, communicate with it and allocate it to the corresponding device file (COM port).

When a serial device is connected, native device drivers allocate the device to /dev/ttyS0. Subsequently the serial base driver catches event and gets information about the device. Then the Serial base driver registers a SerialDevice service with service properties.

When the serial device is disconnected, the Serial base driver catches the event and unregisters the SerialDevice service.

5.4.2 Refining driver bundle

The refining driver bundle determines which SerialDevice service is suitable to establish a communication based on service properties. This process is carried out by the device manager based on device access specifications.

The refining driver bundle will get the SerialDevice service ~~then call the SerialDevice#open() method and acquire the SerialConnection.~~

The bundle executes the necessary settings to the Serial~~Connection~~Device. After this execution, it will acquire the communication stream using Serial~~Device~~Connection#getInputStream(), and/or the Serial~~Connection~~Device#getOutputStream() and initiate a communication with the serial device. ~~The refining driver bundle invokes SerialConnection#close() when the communication is over.~~

5.5 SerialDevice Service

SerialDevice is the interface expressing a serial device. It maintains information and state of the serial device as a service property. It provides the communication facility with the serial device ~~as SerialConnection~~. Each SerialDevice expresses each serial device.

Serial base driver bundle must implement concurrently org.osgi.framework.ServiceFactory to access control. For example, serial base driver might control access to the SerialDevice to a single bundle. The access control is depend on the serial base driver implementation.

SerialDevice service is registered with the service repository with service properties as shown in the following table.

Table 1: Service properties of SerialDevice Service

The key of service property	M/O	Description
DEVICE_CATEGORY	M	Constant for the value of the service property DEVICE_CATEGORY used for all Serial devices. Value is "Serial".
serial.comport	M	Represents the name of the port. The value is String. Example1: "/dev/ttyUSB0" Example2: "COM5" Example3: "/dev/tty.usbserial-XXXXXX"

~~When the refining driver bundle calls SerialDevice#open() method, the SerialDevice Service will return the (new) SerialConnection. A SerialDevice instance returns PortInUseException when some bundle calls SerialDevice#open() method and that method was already called.~~

5.6 ~~SerialConnection~~

~~This is an interface to represent communication with a serial device. Only the refining driver bundles that acquire this instance can communicate with the serial device.~~

~~If a refining driver invokes SerialConnection#close(), any refining drivers cannot use the SerialConnection instance (cannot open streams).~~

5.7 SerialDevice service properties for USB-Serial devices

This clause explains SerialDevice service properties and its usage when an USB-Serial device is used as the serial device.

Table 2: Additional service properties for USB-Serial devices

The key of service property	M/O	Description
bus.type	M	Must be set "USB".
usb.bus	M	MANDATORY property key. The value is `Integer`. Used to identify USB devices with same VID / PID. The value is the ID of the USB bus assigned when connecting the USB device. USB bus ID is integer. The USB bus ID does not change while the USB device remains connected. Example: 3
usb.address	M	MANDATORY property key. The value is `Integer`. Used to identify USB devices with same VID / PID. The value is the ID of the USB address assigned when connecting the USB device. USB address is integer (001-127). The USB address does not change while the USB device remains connected. Example: 2

Universal Serial Bus Specification (USB Specification) defines USB Interface(s). OS maps each USB interface to the corresponding virtual serial device. A Serial base driver bundle must register SerialDevice service to the corresponding virtual serial device. A SerialDevice service has such information as contains USB device information and USB interface information.

5.7.1 Service properties from USB Specification

The USB Specification defines a device descriptor. USB devices report their attributes using descriptors. SerialDevice service has some properties from the USB device descriptors. Table Error: Reference source not found shows the mapping between the device descriptors and service properties of SerialDevice.

Table 3: Device Descriptor and Service Property

Device Descriptor's Field from USB Spec.	Service Property of SerialDevice	M/O	Java type
bLength	`none`	-	–
bDescriptorType	`none`	-	–
bcdUSB	`usb.bcdUSB`	O	`String`
bDeviceClass	`usb.bDeviceClass`	M	`String`
bDeviceSubClass	`usb.bDeviceSubClass`	M	`String`

bDeviceProtocol	usb.bDeviceProtocol	M	String
bMaxPacketSize0	usb.bMaxPacketSize0	O	Integer
idVendor	usb.idVendor	M	String
idProduct	usb.idProduct	M	String
bcdDevice	usb.bcdDevice	M	String
iManufacturer	usb.Manufacturer	O	String
iProduct	DEVICE_DESCRIPTION	O	String
iSerialNumber	DEVICE_SERIAL	O	String
bNumConfigurations	usb.bNumConfigurations	O	Integer

- usb.bcdUSB - OPTIONAL property key. The value is String, the 4-digit BCD format.
  - Example: ”0210”
- usb.bDeviceClass - MANDATORY property key. The value is String, hexadecimal, 2-digits.
  - Example: “ff”
- usb.bDeviceSubClass - MANDATORY property key. The value is String, hexadecimal, 2-digits.
  - Example: ”ff”
- usb.bDeviceProtocol - MANDATORY property key. The value is String, hexadecimal, 2-digits.
  - Example: ”ff”
- usb.bMaxPacketSize0 – OPTIONAL property key. The value is Integer.
- usb.idVendor - MANDATORY property key. The value is String, hexadecimal, 4-digits.
  - Example: “0403”
- usb.idProduct - MANDATORY property key. The value is String, hexadecimal, 4-digits.
  - Example: “8372”
- usb.bcdDevice - MANDATORY property key. The value is String, the 4-digit BCD format.
  - Example: ”0200”

- usb.Manufacturer - OPTIONAL property key. The value is String of indicated in iManufacturer. (The value is not the index.)
  - Example: "Buffalo Inc."
- DEVICE_DESCRIPTION - OPTIONAL property key. The value is String of indicated in iProduct. (The value is not the index.)
  - Example: "USB2.0 PC Camera"
- DEVICE_SERIAL - OPTIONAL property key. The value is String of indicated in iSerialNumber. (The value is not the index.)
  - Example: "57B0002600000001"
- usb.bNumConfigurations – OPTIONAL property key. The value is Integer.

According to the USB Specification, a device descriptor has some interface descriptors.

So these fields add to the service properties (see Table Error: Reference source not found).

Table 4: Interface Descriptor and Service Property

Interface Descriptor's Field from USB Spec.	Service Property of SerialDevice	M/O	Java type
bLength	none	-	–
bDescriptorType	none	-	–
bInterfaceNumber	usb.bInterfaceNumber	M	Integer
bAlternateSetting	usb.bAlternateSetting	O	Integer
bNumEndpoints	usb.bNumEndpoints	O	Integer
bInterfaceClass	usb.bInterfaceClass	M	String
bInterfaceSubClass	usb.bInterfaceSubClass	M	String
bInterfaceProtocol	usb.bInterfaceProtocol	M	String
iInterface	usb.Interface	O	String

- usb.bInterfaceNumber – MANDATORY property key. The value is Integer.
- usb.bAlternateSetting – OPTIONAL property key. The value is Integer.
- usb.bNumEndpoints – OPTIONAL property key. The value is Integer.

- ~~`usb.bInterfaceClass` - MANDATORY property key. The value is `String`, hexadecimal, 2-digits.~~
  - ~~Example: “ff”~~
- ~~`usb.bInterfaceSubClass` - MANDATORY property key. The value is `String`, hexadecimal, 2-digits.~~
  - ~~Example: ”ff”~~
- ~~`usb.bInterfaceProtocol` - MANDATORY property key. The value is `String`, hexadecimal, 2-digits.~~
  - ~~Example: ”ff”~~
- ~~`usb.Interface` - OPTIONAL property key. The value is `String` of indicated in iInterface. (The value is not the index.)~~

5.7.2 ~~Match scale~~

~~When the Driver service is registered by the refining driver bundle, the Device Manager calls Driver#match() with the argument of the SerialDevice service's ServiceReference. The refining driver bundle responds with the value based on below scale.~~

- ~~MATCH_VERSION – Constant for the USB-Serial device match scale, indicating a match with usb.idVendor, usb.idProduct and usb.bcdDevice. Value is 20.~~

~~MATCH_MODEL - Constant for the USB-Serial device match scale, indicating a match with usb.idVendor and usb.idProduct. Value is 10.~~

6 Data Transfer Objects

This RFC does not provide Data Transfer Objects.

7 Javadoc

OSGi Javadoc

10/20/14 5:53 PM

Package Summary		Page
org.osgi.service.serial	Serial Device Service Specification Package Version 1.0.	16

Package org.osgi.service.serial

Serial Device Service Specification Package Version 1.0.

See:

[Description](#)

Interface Summary		Page
SerialDevice	SerialDevice is an interface to express a device performing serial communication. The implement bundle must implement concurrently ServiceFactory interface.	*17*

Exception Summary		Page
SerialDeviceException		*27*

Package org.osgi.service.serial Description

Serial Device Service Specification Package Version 1.0.

Bundles wishing to use this package must list the package in the Import-Package header of the bundle's manifest. This package has two types of users: the consumers that use the API in this package and the providers that implement the API in this package.

Example import for consumers using the API in this package:

```
Import-Package: org.osgi.service.serial; version="[1.0,2.0)"
```

Interface SerialDevice

org.osgi.service.serial

public interface **SerialDevice**

SerialDevice is an interface to express a device performing serial communication. The implement bundle must implement concurrently ServiceFactory interface.

Field Summary		Page
int	**DATABITS_5** Data bits: 5.	19
int	**DATABITS_6** Data bits: 6.	19
int	**DATABITS_7** Data bits: 7.	19
int	**DATABITS_8** Data bits: 8.	19
String	**DEVICE_CATEGORY** Constant for the value of the service property DEVICE_CATEGORY used for all Serial devices.	19
int	**FLOWCONTROL_NONE** Flow control: None.	20
int	**FLOWCONTROL_RTSCTS_IN** Flow control: RTS/CTS on input.	20
int	**FLOWCONTROL_RTSCTS_OUT** Flow control: RTS/CTS on output.	20
int	**FLOWCONTROL_XONXOFF_IN** Flow control: XON/XOFF on input.	20
int	**FLOWCONTROL_XONXOFF_OUT** Flow control: XON/XOFF on output.	20
int	**PARITY_EVEN** Parity: Even.	21
int	**PARITY_MARK** Parity: Mark.	21
int	**PARITY_NONE** Parity: None.	20
int	**PARITY_ODD** Parity: Odd.	20
int	**PARITY_SPACE** Parity: Space.	21
String	**SERIAL_COMPORT** The key string of "serial.comport" service property. Represents the name of the port. The value is String. Example1: "/dev/ttyUSB0" Example2: "COM5" Example3: "/dev/tty.usbserial-XXXXXX"	19
int	**STOPBITS_1** Stop bits: 1.	21

int	**STOPBITS_1_5** Stop bits: 1.5.	21
int	**STOPBITS_2** Stop bits: 2.	21

Method Summary		Page
int	**getBaudRate**() Gets the baud rate value.	22
int	**getDataBits**() Gets the data bits.	22
int	**getFlowControl**() Gets the flow control.	22
InputStream	**getInputStream**() Returns an input stream.	21
OutputStream	**getOutputStream**() Returns an output stream.	22
int	**getParity**() Gets the parity.	22
int	**getStopBits**() Gets the stop bits.	23
boolean	**isCTS**() Gets the CTS state.	23
boolean	**isDSR**() Gets the DSR state.	23
boolean	**isDTR**() Gets the DTR state.	23
boolean	**isRTS**() Gets the DTS state.	23
void	**setBaudRate**(int baudrate) Sets the baud rate.	24
void	**setDataBits**(int dataBits) Sets the data bits.	24
void	**setDTR**(boolean dtr) Sets the DTR state.	25
void	**setFlowControl**(int flowcontrol) Sets the flow control.	24
void	**setParity**(int parity) Sets the parity.	24

void	**setRTS**(boolean rts) Sets the RTS state.	26
void	**setStopBits**(int stopBits) Sets the stop bits.	25

Field Detail

DEVICE_CATEGORY

```
public static final String DEVICE_CATEGORY = "Serial"
```

Constant for the value of the service property DEVICE_CATEGORY used for all Serial devices. Value is "Serial".

SERIAL_COMPORT

```
public static final String SERIAL_COMPORT = "serial.comport"
```

The key string of "serial.comport" service property. Represents the name of the port. The value is String.
Example1: "/dev/ttyUSB0"
Example2: "COM5"
Example3: "/dev/tty.usbserial-XXXXXX"

DATABITS_5

```
public static final int DATABITS_5 = 5
```

Data bits: 5.

DATABITS_6

```
public static final int DATABITS_6 = 6
```

Data bits: 6.

DATABITS_7

```
public static final int DATABITS_7 = 7
```

Data bits: 7.

DATABITS_8

```
public static final int DATABITS_8 = 8
```

Data bits: 8.

FLOWCONTROL_NONE

```
public static final int FLOWCONTROL_NONE = 0
```

Flow control: None.

FLOWCONTROL_RTSCTS_IN

```
public static final int FLOWCONTROL_RTSCTS_IN = 1
```

Flow control: RTS/CTS on input.

FLOWCONTROL_RTSCTS_OUT

```
public static final int FLOWCONTROL_RTSCTS_OUT = 2
```

Flow control: RTS/CTS on output.

FLOWCONTROL_XONXOFF_IN

```
public static final int FLOWCONTROL_XONXOFF_IN = 4
```

Flow control: XON/XOFF on input.

FLOWCONTROL_XONXOFF_OUT

```
public static final int FLOWCONTROL_XONXOFF_OUT = 8
```

Flow control: XON/XOFF on output.

PARITY_NONE

```
public static final int PARITY_NONE = 0
```

Parity: None.

PARITY_ODD

```
public static final int PARITY_ODD = 1
```

Parity: Odd.

PARITY_EVEN

```
public static final int PARITY_EVEN = 2
```

Parity: Even.

PARITY_MARK

```
public static final int PARITY_MARK = 3
```

Parity: Mark.

PARITY_SPACE

```
public static final int PARITY_SPACE = 4
```

Parity: Space.

STOPBITS_1

```
public static final int STOPBITS_1 = 1
```

Stop bits: 1.

STOPBITS_2

```
public static final int STOPBITS_2 = 2
```

Stop bits: 2.

STOPBITS_1_5

```
public static final int STOPBITS_1_5 = 3
```

Stop bits: 1.5.

Method Detail

getInputStream

```
InputStream getInputStream()
                    throws IOException
```

Returns an input stream.

Returns:
an input stream
Throws:
`IOException` - if an I/O error occurred

getOutputStream

```
OutputStream getOutputStream()
                      throws IOException
```

Returns an output stream.

Returns:
an output stream
Throws:
`IOException` - if an I/O error occurred

getBaudRate

```
int getBaudRate()
```

Gets the baud rate value.

Returns:
the baud rate

getDataBits

```
int getDataBits()
```

Gets the data bits.

Returns:
the data bits

getFlowControl

```
int getFlowControl()
```

Gets the flow control.

Returns:
the flow control

getParity

```
int getParity()
```

Gets the parity.

Returns:
the parity

---

getStopBits

```
int getStopBits()
```

Gets the stop bits.

Returns:
the stop bits

---

isDTR

```
boolean isDTR()
```

Gets the DTR state.

Returns:
the DTR state

---

isRTS

```
boolean isRTS()
```

Gets the DTS state.

Returns:
the DTS state

---

isDSR

```
boolean isDSR()
```

Gets the DSR state.

Returns:
the DSR state

---

isCTS

```
boolean isCTS()
```

Gets the CTS state.

Returns:
the CTS state

---

setBaudRate

```
void setBaudRate(int baudrate)
          throws SerialDeviceException
```

Sets the baud rate.

Throws:
SerialDeviceException - if the parameter is specified incorrectly or the parameter is not supported.

---

setDataBits

```
void setDataBits(int dataBits)
          throws SerialDeviceException
```

Sets the data bits.

Parameters:
dataBits -

- DATABITS_5: 5 bits
- DATABITS_6: 6 bits
- DATABITS_7: 7 bits
- DATABITS_8: 8 bits

Throws:
SerialDeviceException - if the parameter is specified incorrectly or the parameter is not supported.

---

setFlowControl

```
void setFlowControl(int flowcontrol)
            throws SerialDeviceException
```

Sets the flow control.

Throws:
SerialDeviceException - if the parameter is specified incorrectly or the parameter is not supported.

---

setParity

```
void setParity(int parity)
        throws SerialDeviceException
```

Sets the parity.

Parameters:

`parity` -

- PARITY_NONE: no parity
- PARITY_ODD: odd parity
- PARITY_EVEN: even parity
- PARITY_MARK: mark parity
- PARITY_SPACE: space parity

Throws:

SerialDeviceException - if the parameter is specified incorrectly or the parameter is not supported.

---

setStopBits

```
void setStopBits(int stopBits)
          throws SerialDeviceException
```

Sets the stop bits.

Parameters:

`stopBits` -

- STOPBITS_1: 1 stop bit
- STOPBITS_2: 2 stop bits
- STOPBITS_1_5: 1.5 stop bits

Throws:

SerialDeviceException - if the parameter is specified incorrectly or the parameter is not supported.

---

setDTR

```
void setDTR(boolean dtr)
     throws SerialDeviceException
```

Sets the DTR state.

Parameters:

`dtr` -

- `true` on DTR
- `false` off DTR

Throws:

SerialDeviceException - if the parameter is specified incorrectly or the parameter is not supported.

---

setRTS

```
void setRTS(boolean rts)
     throws SerialDeviceException
```

Sets the RTS state.

Parameters:

`rts` -

- `true` on RTS
- `false` off RTS

Throws:

`SerialDeviceException` - if the parameter is specified incorrectly or the parameter is not supported.

Class SerialDeviceException

org.osgi.service.serial

```
java.lang.Object
  └java.lang.Throwable
      └java.lang.Exception
          └org.osgi.service.serial.SerialDeviceException
```

All Implemented Interfaces:

Serializable

```
public class SerialDeviceException
extends Exception
```

Constructor Summary	Page
SerialDeviceException(String message)	27

Constructor Detail

SerialDeviceException

```
public SerialDeviceException(String message)
```

8 Considered Alternatives

~~USB Category~~

~~RFC 202 tried to give a technical solution for RFP 149 at the beginning.~~

~~The current draft of RFC 202 did not describe the necessary communication functions and included some unclear definitions regarding protocols (USB, Serial devices, etc). During the discussion at REG WG we decided to take another approach instead of updating RFC 202.~~

9 Security Considerations

ServicePermission is needed when a bundle get SerialDevice service.

10 Document Support

10.1 References

[1]. Bradner, S., Key words for use in RFCs to Indicate Requirement Levels, RFC2119, March 1997.

[2]. Software Requirements & Specifications. Michael Jackson. ISBN 0-201-87712-0

[3]. OSGi Service Platform Service Compendium Release 4, Version 4.3 Device Access Specification, Version 1.1

[4]. Universal Serial Bus Specification Revision 1.1, September 23, 1998.

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10.3 Acronyms and Abbreviations

10.4 End of Document