

Service

| SpecificationName | SpecificationType | AssignedNumber | SpecificationLevel |
|----------------------|--------------------------------------|--------------------------------------|--------------------|
| Open Spatial Service | net.openspatial.service.open_spatial | 00000002-0000-1000-8000-a0e5e9000000 | |

Characteristics

| SpecificationName | SpecificationType | AssignedNumber | SpecificationLevel |
|-------------------|---|--------------------------------------|--------------------|
| Position2D | net.openspatial.characteristic.position_2d | 00000206-0000-1000-8000-a0e5e9000000 | |
| Pose6D | net.openspatial.characteristic.pose6d | 00000205-0000-1000-8000-a0e5e9000000 | |
| ButtonState | net.openspatial.characteristic.button_state | 00000207-0000-1000-8000-a0e5e9000000 | |
| Gestures | net.openspatial.characteristic.gestures | 00000208-0000-1000-8000-a0e5e9000000 | |

The material contained on this page is informative only. Authoritative compliance information is contained in the applicable Bluetooth specification.

Description

Last Modified: 2014-07-03

Approved: No

Name: Open Spatial Service

Type: net.openspatial.service.open_spatial

Assigned Number: 00000002-0000-1000-8000-a0e5e9000000

Abstract:

The Open Spatial framework, with its rich set of APIs, enables applications to interact with their environment using natural gestures.

Summary:

This service implemented on the device, provides gesture data (through characteristics) to hosts interested in them. It also exposes characteristic(s) for host to send commands to the device. The open spatial service is instantiated as a primary service.

Service Dependencies

This service has no dependencies on other GATT-based services.

GATT Requirements

| Sub-Procedure | Server Requirement |
|----------------------------|--------------------|
| Write Characteristic Value | Mandatory |
| Notifications | Mandatory |
| Read Characteristic Value | Mandatory |

Transport Dependencies

| Transport | Supported |
|------------|-----------|
| Classic | false |
| Low energy | true |

Error Codes

This service does not define any application error codes that are used in attribute protocol.

Service Characteristics

| Overview | Properties | Security | Descriptors | | | | | | | | | | | | | | | | | | | | |
|---|--|----------|-------------|------|-----------|-------|----------|----------------------|----------|-------------|----------|--------|-----------|----------|----------|---------------------|----------|-----------|----------|--------------------|--|------|------|
| <p>Name: Position2D</p> <p>Description: This characteristic is used to expose the relative motion of the device from its last known position in 2D space. It is expressed as a tuple(x, y) which holds the respective displacements along those axes.</p> | <table><tr><th>Property</th><th>Requirement</th></tr><tr><td>Read</td><td>Mandatory</td></tr><tr><td>Write</td><td>Excluded</td></tr><tr><td>WriteWithoutResponse</td><td>Excluded</td></tr><tr><td>SignedWrite</td><td>Excluded</td></tr><tr><td>Notify</td><td>Mandatory</td></tr><tr><td>Indicate</td><td>Excluded</td></tr><tr><td>WritableAuxiliaries</td><td>Excluded</td></tr><tr><td>Broadcast</td><td>Excluded</td></tr><tr><td>ExtendedProperties</td><td></td></tr></table> | Property | Requirement | Read | Mandatory | Write | Excluded | WriteWithoutResponse | Excluded | SignedWrite | Excluded | Notify | Mandatory | Indicate | Excluded | WritableAuxiliaries | Excluded | Broadcast | Excluded | ExtendedProperties | | None | None |
| Property | Requirement | | | | | | | | | | | | | | | | | | | | | | |
| Read | Mandatory | | | | | | | | | | | | | | | | | | | | | | |
| Write | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| WriteWithoutResponse | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| SignedWrite | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| Notify | Mandatory | | | | | | | | | | | | | | | | | | | | | | |
| Indicate | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| WritableAuxiliaries | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| Broadcast | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| ExtendedProperties | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Name: Pose6D</p> <p>Description: This characteristic is used to expose the relative translation and rotation of the device from its last known position and orientation in 3D space. It is expressed as a sextet(x, y,z, roll, pitch, yaw) which hold the respective displacements along those axes.</p> | <table><tr><th>Property</th><th>Requirement</th></tr><tr><td>Read</td><td>Mandatory</td></tr><tr><td>Write</td><td>Excluded</td></tr><tr><td>WriteWithoutResponse</td><td>Excluded</td></tr><tr><td>SignedWrite</td><td>Excluded</td></tr><tr><td>Notify</td><td>Mandatory</td></tr><tr><td>Indicate</td><td>Excluded</td></tr><tr><td>WritableAuxiliaries</td><td>Excluded</td></tr><tr><td>Broadcast</td><td>Excluded</td></tr><tr><td>ExtendedProperties</td><td></td></tr></table> | Property | Requirement | Read | Mandatory | Write | Excluded | WriteWithoutResponse | Excluded | SignedWrite | Excluded | Notify | Mandatory | Indicate | Excluded | WritableAuxiliaries | Excluded | Broadcast | Excluded | ExtendedProperties | | None | None |
| Property | Requirement | | | | | | | | | | | | | | | | | | | | | | |
| Read | Mandatory | | | | | | | | | | | | | | | | | | | | | | |
| Write | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| WriteWithoutResponse | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| SignedWrite | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| Notify | Mandatory | | | | | | | | | | | | | | | | | | | | | | |
| Indicate | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| WritableAuxiliaries | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| Broadcast | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| ExtendedProperties | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Name: ButtonState</p> <p>Description:</p> | <table><tr><th>Property</th><th>Requirement</th></tr><tr><td>Read</td><td>Mandatory</td></tr></table> | Property | Requirement | Read | Mandatory | | | | | | | | | | | | | | | | | | |
| Property | Requirement | | | | | | | | | | | | | | | | | | | | | | |
| Read | Mandatory | | | | | | | | | | | | | | | | | | | | | | |

| <p>This characteristic provides information about the state of buttons and tactiles, e.g., pressed, released etc.</p> | <table><tr><td>Write</td><td>Excluded</td></tr><tr><td>WriteWithoutResponse</td><td>Excluded</td></tr><tr><td>SignedWrite</td><td>Excluded</td></tr><tr><td>Notify</td><td>Mandatory</td></tr><tr><td>Indicate</td><td>Excluded</td></tr><tr><td>WritableAuxiliaries</td><td>Excluded</td></tr><tr><td>Broadcast</td><td>Excluded</td></tr><tr><td>ExtendedProperties</td><td></td></tr></table> | Write | Excluded | WriteWithoutResponse | Excluded | SignedWrite | Excluded | Notify | Mandatory | Indicate | Excluded | WritableAuxiliaries | Excluded | Broadcast | Excluded | ExtendedProperties | | None | None | | | | |
|---|--|----------|-------------|----------------------|-----------|-------------|----------|----------------------|-----------|-------------|----------|---------------------|-----------|-----------|----------|---------------------|----------|-----------|----------|--------------------|--|------|------|
| Write | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| WriteWithoutResponse | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| SignedWrite | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| Notify | Mandatory | | | | | | | | | | | | | | | | | | | | | | |
| Indicate | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| WritableAuxiliaries | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| Broadcast | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| ExtendedProperties | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Name: Gestures</p> <p>Description: This characteristic provides information about ScrollUp/ScrollDown, translation of the device to up/down/left/right in 3D space and for any such gestural events.</p> | <table><tr><th>Property</th><th>Requirement</th></tr><tr><td>Read</td><td>Mandatory</td></tr><tr><td>Write</td><td>Excluded</td></tr><tr><td>WriteWithoutResponse</td><td>Excluded</td></tr><tr><td>SignedWrite</td><td>Excluded</td></tr><tr><td>Notify</td><td>Mandatory</td></tr><tr><td>Indicate</td><td>Excluded</td></tr><tr><td>WritableAuxiliaries</td><td>Excluded</td></tr><tr><td>Broadcast</td><td>Excluded</td></tr><tr><td>ExtendedProperties</td><td></td></tr></table> | Property | Requirement | Read | Mandatory | Write | Excluded | WriteWithoutResponse | Excluded | SignedWrite | Excluded | Notify | Mandatory | Indicate | Excluded | WritableAuxiliaries | Excluded | Broadcast | Excluded | ExtendedProperties | | None | None |
| Property | Requirement | | | | | | | | | | | | | | | | | | | | | | |
| Read | Mandatory | | | | | | | | | | | | | | | | | | | | | | |
| Write | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| WriteWithoutResponse | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| SignedWrite | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| Notify | Mandatory | | | | | | | | | | | | | | | | | | | | | | |
| Indicate | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| WritableAuxiliaries | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| Broadcast | Excluded | | | | | | | | | | | | | | | | | | | | | | |
| ExtendedProperties | | | | | | | | | | | | | | | | | | | | | | | |

Last Modified: 2014-07-03

Approved: No

Name: Position2D

Type: net.openspatial.characteristic.position_2d

Assigned Number: 00000206-0000-1000-8000-a0e5e9000000

Summary:

The Position2D characteristic is used to expose the relative translation of the device from its last known position in 2D space. It is expressed as (x, y) which hold the respective displacements along those axes.

Value Fields

| Names | Field Requirement | Format | Minimum Value | Maximum Value | Additional Information |
|-------|-------------------|--------|---------------|---------------|------------------------|
| x | Mandatory | int16 | n/a | n/a | |
| y | Mandatory | int16 | n/a | n/a | |

Data packaging of Position2D:

| bytes 3 - 2 | bytes 1 - 0 |
|-------------|-------------|
| y | x |

Note: The byte stream above is little-endian formatted.

Last Modified: 2014-07-03

Approved: No

Name: Pose6D

Type: net.openspatial.characteristic.pose6d

Assigned Number: 00000205-0000-1000-8000-a0e5e9000000

Summary:

This characteristic is used to expose the relative translation and rotation of the device from its last known position and orientation in 3D space. It is expressed as a sextet(x, y,z, roll, pitch, yaw) which hold the respective displacements along those axes.

Value Fields

| Names | Field Requirement | Format | Minimum Value | Maximum Value | Additional Information |
|-----------|-------------------|--------|---------------|---------------|------------------------|
| x | Mandatory | int16 | n/a | n/a | |
| y | Mandatory | int16 | n/a | n/a | |
| z | Mandatory | int16 | n/a | n/a | |
| r (roll) | Mandatory | int16 | n/a | n/a | |
| p (pitch) | Mandatory | int16 | n/a | n/a | |
| y (yaw) | Mandatory | int16 | n/a | n/a | |

x, y and z are the three axes from cartesian coordinate system which are relative to the position of the device. As the device orientation changes, the coordinate system moves accordingly.

Data packaging of Pose6D:

| Bytes 11 - 10 | Bytes 9 - 8 | Bytes 7 - 6 | Bytes 5 - 4 | Bytes 3 - 2 | Bytes 1 - 0 |
|---------------|-------------|-------------|-------------|-------------|-------------|
| y | p | r | z | y | x |

Note: The byte stream above is little-endian formatted.

Last Modified: 2014-07-03

Approved: No

Name: ButtonState

Type: net.openspatial.characteristic.button_state

Assigned Number: 00000207-0000-1000-8000-a0e5e9000000

Summary:

This characteristic provides information about the state of buttons and tactiles, e.g., pressed, released etc.

Value Fields

| Names | Field Requirement | Format | Minimum Value | Maximum Value | Additional Information |
|----------|-------------------|---------------------|---------------|---------------|--|
| Touch0 | Mandatory | uint16 ⁺ | n/a | n/a | bit 0 is 1 if touched*, 0 otherwise bit 1 is 1 if released, 0 otherwise |
| Touch1 | Mandatory | uint16 ⁺ | n/a | n/a | bit 2 is 1 if touched*, 0 otherwise bit 3 is 1 if released, 0 otherwise |
| Touch2 | Mandatory | uint16 ⁺ | n/a | n/a | bit 4 is 1 if touched*, 0 otherwise bit 5 is 1 if released, 0 otherwise |
| Tactile0 | Mandatory | uint16 ⁺ | n/a | n/a | bit 6 is 1 if touched*, 0 otherwise bit 7 is 1 if released, 0 otherwise |
| Tactile1 | Mandatory | uint16 ⁺ | n/a | n/a | bit 8 is 1 if touched*, 0 otherwise bit 9 is 1 if released, 0 otherwise |

* If touched and released events are delivered at the same time, then the order for processing them are touched followed by released event.

+ The bit packaging is as follows

| bits 15 - 10 | bits 9 - 8 | bits 7 - 6 | bits 5 - 4 | bits 3 - 2 | bits 1 - 0 |
|--------------|------------|------------|------------|------------|------------|
| Reserved | Tactile 1 | Tactile 0 | Touch 2 | Touch 1 | Touch 0 |

Note: The byte stream above is little-endian formatted.

Last Modified: 2014-07-03

Approved: No

Name: Gestures

Type: net.openspatial.characteristic.gestures

Assigned Number: 00000208-0000-1000-8000-a0e5e9000000

Summary:

This characteristic provides information about ScrollUp/ScrollDown, translation of the device to up/down/left/right in 3D space and for any such gestural events.

Value Fields

| Names | Field Requirement | Format | Minimum Value | Maximum Value | Additional Information |
|---------|-------------------|-----------------------|---------------|---------------|---|
| Gesture | Mandatory | variable ⁺ | n/a | n/a | This is an array of bytes carrying gesture opcode in first two bytes, with relevant payload data if any in subsequent bytes |

⁺ The byte format is as below:

| Data (Bytes 2 and beyond upto size of bluetooth PDU) | Opcode (Byte 0 and 1) |
|--|---------------------------------|
| optional | See gestures opcode table below |

Note: The byte stream above is little-endian formatted.

Gestures opcode table:

| Opcode name | Opcode value (byte1 byte0) | Data (byte2 byte3 byte4 ...) | Additional Information |
|-------------|----------------------------|--|--|
| Scroll | 0x0001 | 0x01 - scroll up 0x02 - scroll down | device implementation specific In Nod, slide left on slider is scroll down, and slide right is scroll up. |
| Directions | 0x0002 | Following values are provided in byte 3: 0x01 - right gesture 0x02 - left gesture 0x03 - down gesture 0x04 - up gesture 0x05 - CW (clock-wise) 0x06 - CCW (counter clock-wise) | relative direction to device translation |
| Reserved | 0x0003 to 0xFFFF | undefined | |