Accessory

Programming Guide

Version 1.0

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1. Overview

Accessory allows you to develop applications on Samsung Smart Devices and Accessory Device. You can connect Accessory Devices to Samsung Smart Devices without worrying about connectivity issues or network protocols.

You can use Accessory to:

- Advertise and discover Accessory Services.
- Set up and close Service Connections with one or more logical Service Channels.
- Support Service Connections using a range of connectivity options.
- Configure Accessory Service Profiles and roles for Accessory Peer Agents.

1.1. Basic Knowledge

The Accessory eco-system consists of one or more Samsung Smart Devices and Accessory Devices that support the Samsung Accessory Protocol:

- Smart Devices: Samsung smart phone and tablet devices.
  Later releases may include other devices, such as Samsung Smart TVs, cameras, and laptops.
  Compliant Smart Devices support the Samsung Accessory Protocol and usually include built-in support for popular Accessory Service Profiles.
- Accessory Devices: Auxiliary devices that connect to Smart Devices.
  Compliant Accessory Devices support the Samsung Accessory Protocol and can interact with compliant Smart Devices using a range of connectivity options.

The following figure shows the roles in the Accessory eco-system.

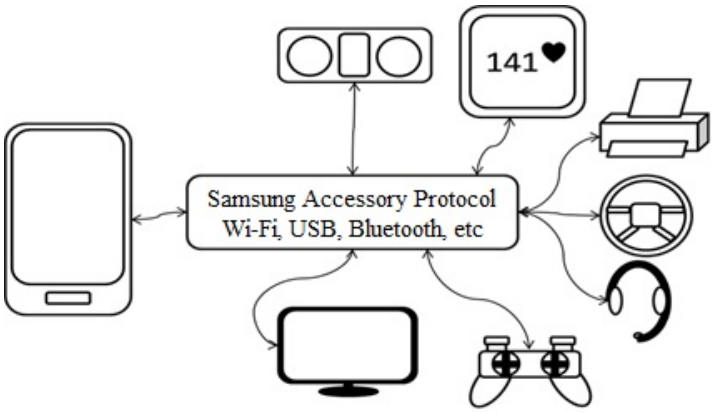

Figure 1: Accessory eco-system

Samsung Smart Devices can support one or more Accessory Services using a manager application with the Samsung Accessory Service Framework, for example, Samsung GEAR Manager. The Smart Devices and Accessory Devices described in this document have the Samsung Accessory Service Framework preloaded.

1.2. Architecture

The following figure shows the Accessory architecture.

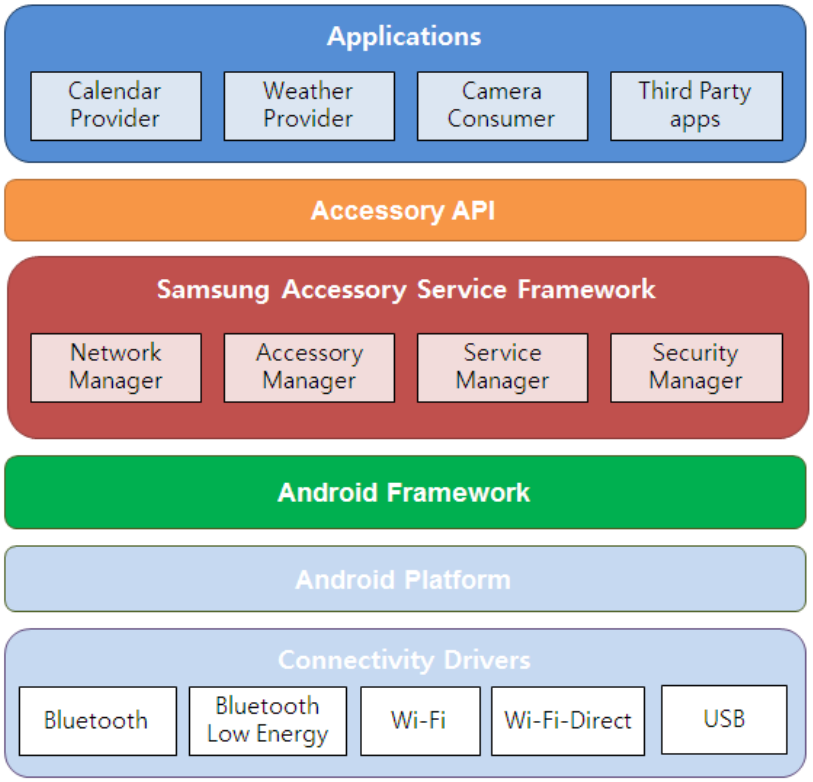

Figure 2: Accessory architecture

Application Level Entities (ALE), for example, Calendar Provider and Camera Consumer, use the Accessory package as a facade. Accessory communicates with the Samsung Accessory Service Framework pre-loaded on Samsung Smart Devices. The Samsung Accessory Service Framework is built on top of Android stacks of connectivity methods, for example, Wi-Fi, Bluetooth, and USB.

1.2.1. Accessory Eco-system Terminology

The following terms are used when describing the Accessory eco-system:

- **Accessory service profile**

  An Accessory Service Profile defines the roles of a Service Provider and Consumer, and specifies the formats for application-level protocol messages and message sequences between Service Consumers and Providers. The Notification accessory service profile, for example, defines the JSON schemas for messages used to send and receive notifications between Samsung Smart Devices and compliant Accessory Devices. An Accessory Service Profile also defines message sequences between a notification Service Consumer and a notification Service Provider.

- **Service Provider**

  A Service Provider is an ALE with a role defined in the associated Accessory Service Profile specification. A Service Provider accepts incoming service connections from Service Consumers and

initiates outgoing service connections to Service Consumers. A Service Provider registers with the Samsung Accessory Service Framework to advertise its services to Service Consumers on connected Accessory Devices. A notification Service Provider implemented on a Smart device, for example, provides notifications from that Smart Device to interested Service Consumers on connected Accessory Devices.

- **Service Consumer**

  A Service Consumer is an ALE with a role defined in the associated Accessory Service Profile specification. A Service Consumer discovers a matching Service Provider using the Capability Exchange Protocol, initiates outgoing service connections with the matching Service Provider, and accepts service connection requests from Service Providers. A Service Consumer uses the information or service provided by the matching Service Provider. A Service Consumer has to register with the Samsung Accessory Service Framework. A notification Service Consumer implemented on an Accessory Device, for example, receives notification information from the notification Service Provider on a connected Smart Device.

- **Accessory peer agent**

  An Accessory Peer Agent is the main interface between the Samsung Accessory Service Framework and the ALE implementing a Service Provider or Consumer. The Samsung Accessory Service Framework views both Service Providers and Consumers as Accessory Peer Agents.

- **Service connection**

  A service connection represents the dialog between a Service Consumer and Provider. A service connection includes one or more service channels for data exchange between a Service Consumer and Provider.

- **Service channel**

  A service channel is a logical data channel between a Service Consumer and Provider. The channel ID, data rate, priority, and datagram delivery type distinguish service channels from each other. While a service connection is a multi-lane highway between a Service Consumer and Provider, the service channel is an individual lane of that highway.

1.2.2. Functional Flow Between a Service Consumer and Provider

The Samsung Accessory Protocol supports multiple connectivity methods, for example, Wi-Fi, Bluetooth classic, Bluetooth Low Energy (v4.0), and USB, while freeing you from connectivity-specific details. The Samsung Accessory Service Framework supports the discovery of features (services) and enables the establishment of accessory service connections between ALEs for the data exchange.

The following figure shows the functional flow in the Samsung Accessory Service Framework between a Service Consumer and Provider. Peer device 1 and 2 are either Samsung Smart Devices or Accessory Devices with applications acting as Service Providers or Consumers.

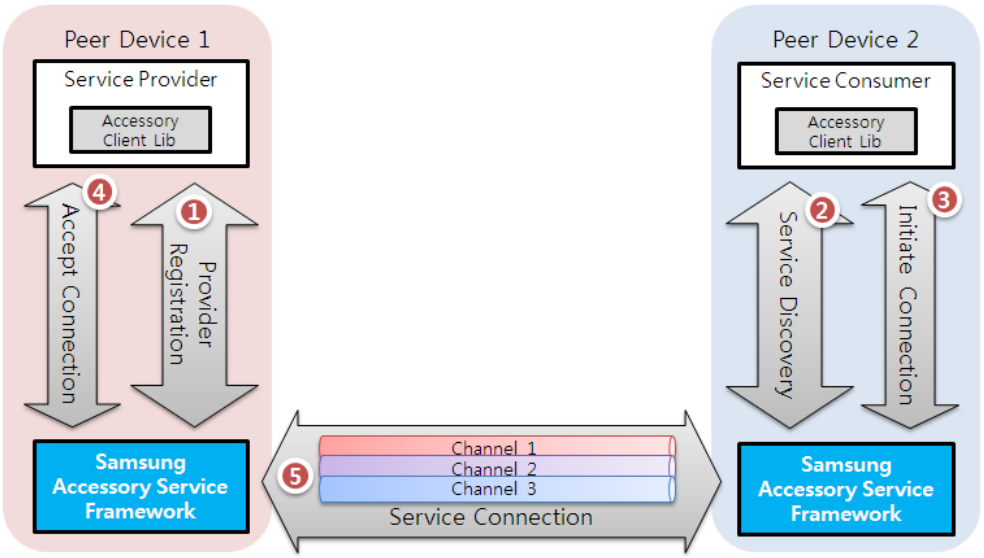

Figure 3: Functional flow between Service Provider and Consumer

1. The Service Provider and Consumer applications register their service capabilities with the Samsung Accessory Service Framework. The Samsung Accessory Service Framework advertises and exchanges the capabilities of the registered Service Providers and Consumers.
2. The Service Consumer looks for Service Providers of interest, and queries the Samsung Accessory Service Framework, which in turn queries the services offered by connected Accessory Devices.
3. The Service Consumer attempts to establish a service connection with the Service Provider.
   A Service Provider can also try to establish a service connection with Service Consumers.
4. The Service Provider decides to accept or reject the service connection request (if the Service Provider attempted to establish a connection, the Service Consumer decides to accept or reject the service connection request).
5. The service connection is established, creating all the service channels defined by the associated Accessory Service Profile.
   The Service Consumer and Provider use the established service connection to read and write data following the associated Accessory Service Profile specification on the service channels.

1.2.3. Accessory Peer Agent State Machine

Accessory Peer Agents, both Service Providers and Consumers, handle concurrent instances. A Service Provider can accept incoming service connections from multiple Service Consumers with the same Accessory Service Profile, for example, the notification service. Similarly, a Service Consumer can accept incoming service connections from multiple Service Providers with the same Service Profile.

Every accepted service connection request results in the creation of a SASocket object, which represents the dialog between a Service Provider and Consumer. The Samsung Accessory Service Framework establishes one or more service channels with the QoS parameters defined by the Accessory Service Profile. The SASocket object encapsulates these service channels.

The following figure shows the state machine of an Accessory Peer Agent with a remote Accessory Peer Agent. If there is more than one remote Accessory Peer Agent, the Accessory Peer Agent can have different states with different remote Accessory Peer Agents. For example, some remote Accessory Peer Agents can be in a connected state, while others are in a registered (disconnected) state.

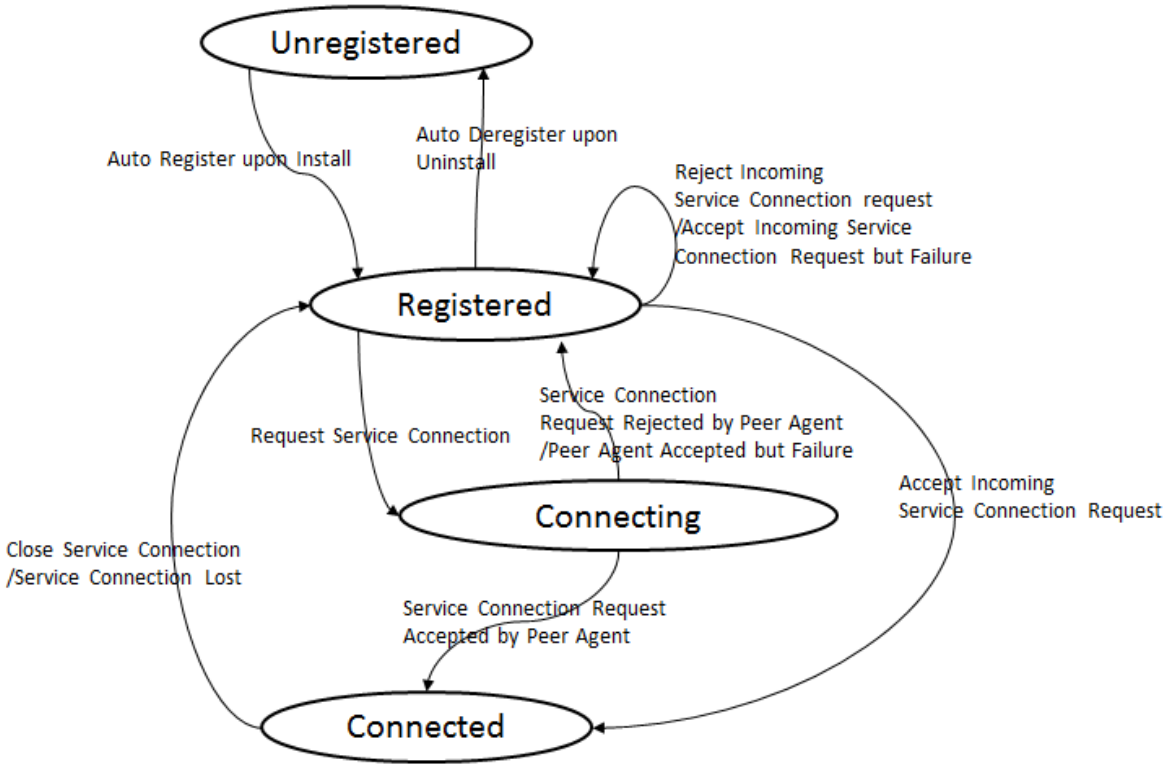

Figure 4: State machine of an accessory peer agent

The figure illustrates the following states:

- A Service Provider or Consumer application automatically registers with the Samsung Accessory Service Framework upon installation, and enters a “registered” state. Similarly, the application automatically deregisters upon uninstallation and goes to an “unregistered” state.
- The Accessory Peer Agent enters a “connecting” state when it initiates an outgoing service connection with a matching remote Accessory Peer Agent with the same Accessory Service Profile and a complementary Provider/Consumer relationship.
- The Samsung Accessory Service Framework establishes a service connection if a remote accessory peer agent accepts a service request. The accessory peer agent enters a “connected” state on success. If the remote accessory peer agent rejects a service connection request or if there is a failure, the accessory peer agent goes back to the “registered” state.
- When a service connection request from a remote Accessory Peer Agent is received, the Service Provider or Consumer application is notified and the application accepts or rejects the incoming service connection request. If the application accepts the request and the service connection is successfully established, the Accessory Peer Agent enters the “connected” state. Otherwise, it remains in the “registered” state.

The following figure shows the sequence flow of the Accessory Peer Agent.

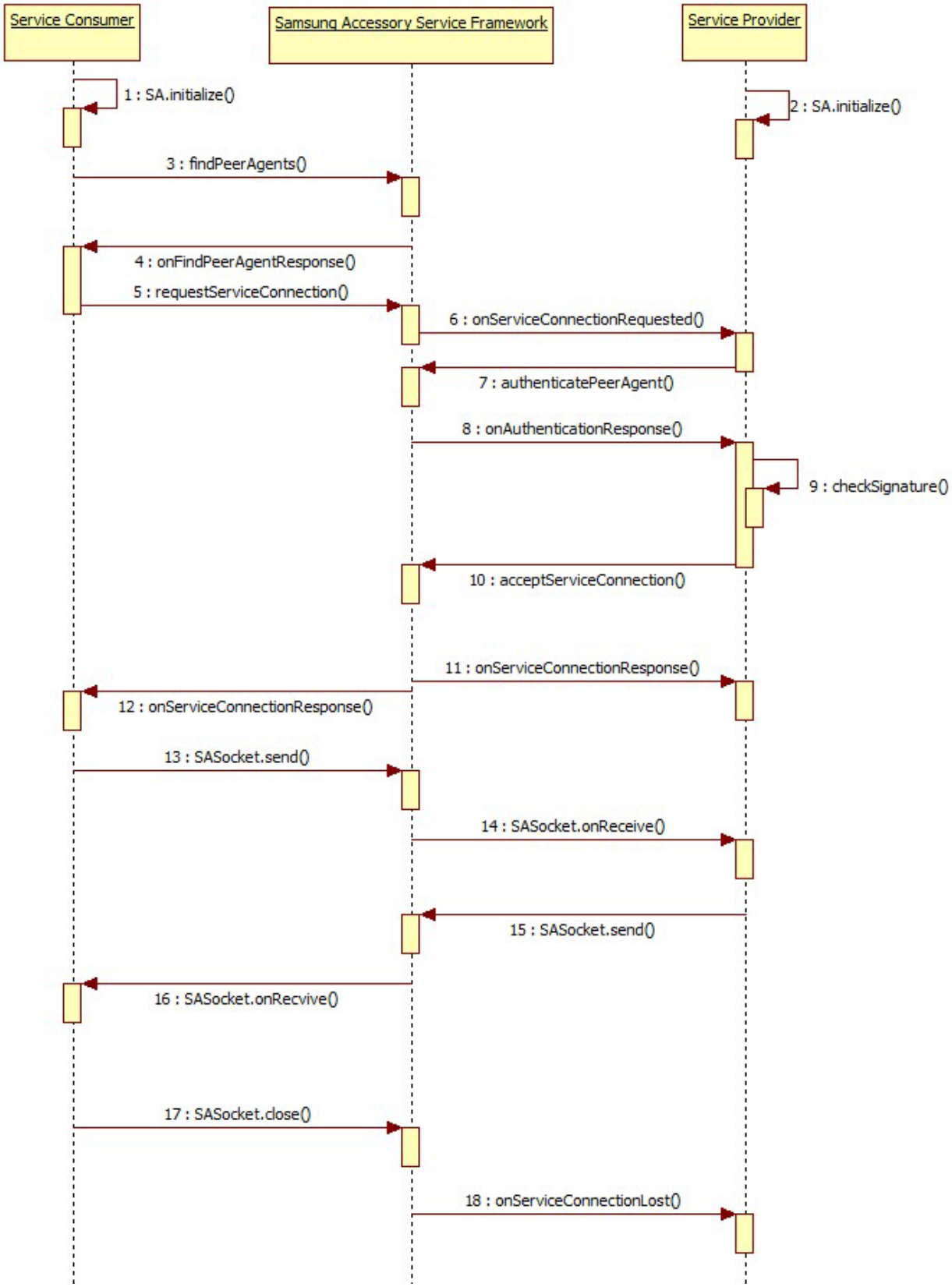

Figure 5: Sequence flow of the Accessory Peer Agent

1.3. Class Diagram

The following figure shows the Accessory classes and interfaces that you can use in your application.

Figure 6: Accessory classes and interfaces

The Accessory classes and interfaces include:

- **SA:** Initializes the Accessory package.
- **SAAgent:** Represents an Accessory Peer Agent. Both the Service Provider and Consumer implementations are expected to extend this class for each Accessory Service Profile instance they implement. This class exposes request methods creating outgoing service connections with matching remote Accessory Peer Agents. In case your Accessory Peer Agent sends an outgoing service connection request, your application is notified when the request result becomes available (with service connection establishment, through a rejection by the remote Accessory Peer Agent, or due to a failure). Remote Accessory Peer Agents can also initiate service connect requests with your Accessory Peer Agent.
- Your application is expected to implement the method handling for incoming service connection requests, deciding to accept or reject incoming service connection requests (trigger UI activities if needed). If a service connection is successfully established, both Accessory Peer Agents (service Provider and Consumer at both ends of the service connection) are notified with a callback, with an instance of the SASocket object passed by the Samsung Accessory Service Framework.
- **SASocket:** Represents a service connection between a Service Provider and Consumer. This class handles service connection related events. Both the Service Consumer and Provider implementations extend this class to receive data on established service channels and send data according to the Accessory Service Profile specification.
- **SAPeerAgent:** Represents a remote Accessory Peer Agent. This is a passive entity that encapsulates the information of the remote Accessory Peer Agent. The remote Accessory Peer Agent information includes, for example, the version of the Accessory Service Profile specification that the Accessory Peer Agent implements or follows, the application name, and the Accessory Device.
- **SAPeerAccessory:** Represents a remote Accessory Device. It is a component of SAPeerAgent. SAPeerAccessory is a passive entity encapsulating the information of an Accessory Device. SAPeerAccessory information includes, for example, the vendor ID, product ID, device name, and address.

For more information on the Accessory classes, see the Accessory API Reference.

1.4. Supported Platforms

Android 4.3 or above supports Accessory.

1.5. Supported Features

Samsung works with domain experts within and outside Samsung to define Accessory Service Profiles. The Accessory Service Profiles define the application-level state machine and application-level protocol to implement domain-specific functionality. For example, the Notification Accessory Service Profile defines an application-level protocol to convey phone notifications to connected Accessory Devices.

Accessory supports the following features:

- Accessory agent:
    - Getting the list of Accessory Peer Devices.
    - Getting the list of services offered by the Accessory Peer Devices.
    - Identifying the available services between Peer Devices.
- Service connection:
    - Creating and storing the connection between Accessory Peer Devices.
    - Initiating a service connection request or providing a service.
    - Processing service connection requests from peer devices to provide or consume a service.
    - Closing a service connection.

1.6. Components

- Components
    - accessory-v1.0.0.jar
    - sdk-v1.0.0.jar
    - Samsung Accessory Service Framework (preloaded on Samsung Smart Devices and Accessory Devices)
- Imported classes:
    - com.samsung.android.sdk.accessory.*
    - com.samsung.android.sdk.SsdkUnsupportedException

1.7. Installing the Package for Eclipse

To install Accessory for Eclipse:

1. Add the following files accessory-v1.0.0.jar and sdk-v1.0.0.jar files to the libs folder of your service Provider or Service Consumer application in Eclipse:

- accessory-v1.0.0.jar
  The client lib file of the Accessory package.
- sdk-v1.0.0.jar
  The client lib file for the Samsung Mobile SDK. To use any packages of the Samsung Mobile SDK family, this lib file must be included.

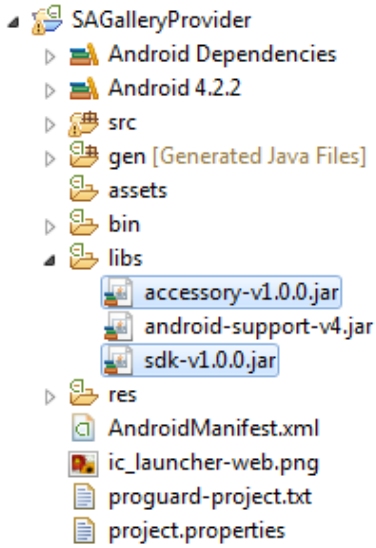

Figure 7: libs folder in Eclipse

2. Hello Accessory

Hello Accessory consists of 2 applications: Hello Provider and Hello Consumer. Hello Provider can run on a Smart Device and Hello Consumer on an Accessory Device, or Hello Provider on an Accessory Device and Hello Consumer on a Smart Device.

Hello Accessory applications form a simple program that:

1. Both Hello Accessory Provider and Hello Accessory Consumer initialize the Accessory package.
2. Both Hello Accessory Provider and Hello Accessory Consumer register their capability with the Samsung Accessory Service Framework.
3. Hello Accessory Consumer searches for Hello Accessory Provider, and initiates a service connection.
4. Hello Accessory Provider sends a “Hello” string data to Hello Accessory Consumer.

2.1. Hello Accessory Provider

HelloAccessoryProviderService.java:

```
package com.samsung.android.example.helloaccessoryProvider.service;

import java.io.IOException;
import java.util.HashMap;
import android.content.Intent;
import android.os.Binder;
import android.os.IBinder;
import android.text.format.Time;
import android.util.Log;
import android.widget.Toast;
import com.samsung.android.example.helloaccessoryProvider.R;
import com.samsung.android.sdk.SsdkUnsupportedException;
import com.samsung.android.sdk.accessory.SA;
import com.samsung.android.sdk.accessory.SAAgent;
import com.samsung.android.sdk.accessory.SAPeerAgent;
import com.samsung.android.sdk.accessory.SASocket;

public class HelloAccessoryProviderService extends SAAgent {
    public static final String TAG = "HelloAccessoryProviderService";
    public static final int SERVICE_CONNECTION_RESULT_OK = 0;
    public static final int HELLOACCESSORY_CHANNEL_ID = 104;

    HashMap<Integer, HelloAccessoryProviderConnection> mConnectionsMap = null;

    private final IBinder mBinder = new LocalBinder();
    public class LocalBinder extends Binder {
        public HelloAccessoryProviderService getService() {
            return HelloAccessoryProviderService.this;
        }
    }

    public HelloAccessoryProviderService() {
        super(TAG, HelloAccessoryProviderConnection.class);
    }

    public class HelloAccessoryProviderConnection extends SASocket {
        private int mConnectionId;
```

```
        public HelloAccessoryProviderConnection() {
            super(HelloAccessoryProviderConnection.class.getName());
        }

        @Override
        public void onError(int channelId, String errorString, int error) {
            Log.e(TAG, "Connection is not alive ERROR: " + errorString + "  "
                    + error);
        }

        @Override
        public void onReceive(int channelId, byte[] data) {
            Log.d(TAG, "onReceive");

            Time time = new Time();
            time.set(System.currentTimeMillis());
            String timeStr = " " + String.valueOf(time.minute) + ":"
                    + String.valueOf(time.second);

            String strToUpdateUI = new String(data);
            String message = strToUpdateUI.concat(timeStr);

            HelloAccessoryProviderConnection uHandler = mConnectionsMap.get(Integer
                    .parseInt(String.valueOf(mConnectionId)));

            try {
                uHandler.send(HELLOACCESSORY_CHANNEL_ID, message.getBytes());
            } catch (IOException e) {
                e.printStackTrace();
            }
        }

        @Override
        protected void onServiceConnectionLost(int errorCode) {
            Log.e(TAG, "onServiceConectionLost  for peer = " + mConnectionId
                    + "error code =" + errorCode);

            if (mConnectionsMap != null) {
                mConnectionsMap.remove(mConnectionId);
            }
        }
    }

    @Override
    public void onCreate() {
        super.onCreate();
        Log.i(TAG, "onCreate of smart view Provider Service");

        SA mAccessory = new SA();
        try {
            mAccessory.initialize(this);
            boolean isFeatureEnabled = mAccessory.isFeatureEnabled(SA.DEVICE_ACCESSORY);
        } catch (SsdkUnsupportedException e) {
            // Error Handling
        } catch (Exception e1) {
            Log.e(TAG, "Cannot initialize SAccessory package.");
            e1.printStackTrace();
            /*
             * Your application cannot use Samsung Accessory SDK. You
             * application should work smoothly without using this SDK, or you
             * may want to notify user and close your app gracefully (release
             * resources, stop Service threads, close UI thread, etc.)
             */
            stopSelf();
```

```
        }

    }

    @Override
    protected void onServiceConnectionRequested(SAPeerAgent peerAgent) {
        acceptServiceConnectionRequest(peerAgent);
    }

    @Override
    protected void onFindPeerAgentResponse(SAPeerAgent arg0, int arg1) {
        // TODO Auto-generated method stub
        Log.d(TAG, "onFindPeerAgentResponse  arg1 =" + arg1);
    }

    @Override
    protected void onServiceConnectionResponse(SASocket thisConnection,
            int result) {
        if (result == CONNECTION_SUCCESS) {
            if (thisConnection != null) {
                HelloAccessoryProviderConnection myConnection =
(HelloAccessoryProviderConnection) thisConnection;

                if (mConnectionsMap == null) {
                    mConnectionsMap = new HashMap<Integer, HelloAccessoryProviderConnection>();
                }

                myConnection.mConnectionId = (int) (System.currentTimeMillis() & 255);

                Log.d(TAG, "onServiceConnection connectionID = "
                        + myConnection.mConnectionId);

                mConnectionsMap.put(myConnection.mConnectionId, myConnection);

                Toast.makeText(getBaseContext(),
                        R.string.ConnectionEstablishedMsg, Toast.LENGTH_LONG)
                        .show();
            } else {
                Log.e(TAG, "SASocket object is null");
            }
        } else if (result == CONNECTION_ALREADY_EXIST) {
            Log.e(TAG, "onServiceConnectionResponse, CONNECTION_ALREADY_EXIST");
        } else {
            Log.e(TAG, "onServiceConnectionResponse result error =" + result);
        }
    }

    @Override
    public IBinder onBind(Intent arg0) {
        return mBinder;
    }
}
```

accessoryservices.xml:

```
<resources>
<application name="HelloAccessoryProvider">
<serviceProfile
    id="/system/helloaccessory"
    name="helloaccessory"
    role="Provider"
    serviceImpl="com.samsung.android.example.helloaccessoryProvider.service.HelloAccessoryProviderService"
    version="1.0"
    serviceLimit="ANY"
    serviceTimeout="10">
```

```
    <supportedTransports>
        <transport type="TRANSPORT_BT" />
    </supportedTransports>
    <serviceChannel
        id="104"
        dataRate="low"
        priority="low"
        reliability="enable" >
    </serviceChannel>
</serviceProfile>
</application>
</resources>
```

2.2. Hello Accessory Consumer

HelloAccessoryConsumerService.java:

```
package com.samsung.android.example.helloaccessoryConsumer.service;

import java.io.IOException;
import android.content.Intent;
import android.os.Binder;
import android.os.Handler;
import android.os.IBinder;
import android.util.Log;
import android.widget.Toast;

import com.samsung.android.example.helloaccessoryConsumer.R;
import com.samsung.android.example.helloaccessoryConsumer.ui.HelloAccessoryActivity;
import com.samsung.android.sdk.SsdkUnsupportedException;
import com.samsung.android.sdk.accessory.SA;
import com.samsung.android.sdk.accessory.SAAgent;
import com.samsung.android.sdk.accessory.SAPeerAgent;
import com.samsung.android.sdk.accessory.SASocket;

public class HelloAccessoryConsumerService extends SAAgent {
    public static final String TAG = "HelloAccessoryConsumerService";
    public static final int HELLOACCESSORY_CHANNEL_ID = 104;

    @Override
    protected void onError(String errorMessage, int errorCode) {
        super.onError(errorMessage, errorCode);

        Log.e(TAG, "HelloAccessoryConsumerService.onError() errorCode: " + errorCode);
    }

    private final IBinder mBinder = new LocalBinder();

    Handler mHandler = new Handler();

    public HelloAccessoryConsumerService() {
        super("HelloAccessoryConsumerService", HelloAccessoryConsumerConnection.class);
    }

    public class LocalBinder extends Binder {
        public HelloAccessoryConsumerService getService() {
            return HelloAccessoryConsumerService.this;
        }
    }

    private SASocket mConnectionHandler;
```

```
    public class HelloAccessoryConsumerConnection extends SASocket {
        public HelloAccessoryConsumerConnection() {
            super(HelloAccessoryConsumerConnection.class.getName());
        }

        @Override
        public void onError(int channelId, String errorMessage, int errorCode) {
            Log.e(TAG, "SASocket.onError, errorCode:" + errorCode);
        }

        @Override
        public void onReceive(int channelId, byte[] data) {
            Log.d(TAG, "HelloAccessoryConsumerConnection.onReceive()");

            final String strToUpdateUI = new String(data);

            mHandler.post(new Runnable() {
                @Override
                public void run() {
                    Log.d(TAG, "HelloAccessoryConsumerConnection.run()");

                    HelloAccessoryActivity.mTextView.setText(strToUpdateUI);
                }
            });
        }

        @Override
        protected void onServiceConnectionLost(int reason) {
            Log.e(TAG, "Service Connection Lost, Reason: " + reason);

            closeConnection();
        }
    }

    public void findPeers() {
        Log.d(TAG, "findPeerAgents()");

        findPeerAgents();
    }

    @Override
    public void onCreate() {
        super.onCreate();
        Log.i(TAG, "onCreate of smart view Provider Service");

        SA mAccessory = new SA();
        try {
            mAccessory.initialize(this);
            boolean isFeatureEnabled = mAccessory.isFeatureEnabled(SA.DEVICE_ACCESSORY);
        } catch (SsdkUnsupportedException e) {
            // Error Handling
        } catch (Exception e1) {
            Log.e(TAG, "Cannot initialize SAccessory package.");
            e1.printStackTrace();
            /*
             * Your application cannot use Accessory package of Samsung Mobile SDK.
             * Your application should work smoothly without using this package, or
             * you may want to notify user and close your app gracefully (release
             * resources, stop Service threads, close UI thread, etc.)
             */
            stopSelf();
        }
    }

    @Override
```

```
    protected void onServiceConnectionRequested(SAPeerAgent peerAgent) {
        acceptServiceConnectionRequest(peerAgent);
    }

    @Override
    protected void onFindPeerAgentResponse(SAPeerAgent remoteAgent, int result) {
        Log.e(TAG, "Service onFindPeerAgentResponse: result" + result);

        if (result == PEER_AGENT_FOUND) {
            onPeerFound(remoteAgent);
        }
    }

    @Override
    protected void onServiceConnectionResponse(SASocket thisConnection,
            int connResult) {
        Log.d(TAG, "onServiceConnectionResponse: connResult" + connResult);

        if (connResult == CONNECTION_SUCCESS) {
            Log.d(TAG, "Service connection CONNECTION_SUCCESS");

            this.mConnectionHandler = thisConnection;
            Toast.makeText(getBaseContext(), R.string.ConnectionEstablishedMsg,
                    Toast.LENGTH_LONG).show();
        } else if (connResult == CONNECTION_ALREADY_EXIST) {
            Log.d(TAG, "Service connection CONNECTION_ALREADY_EXIST");
            Toast.makeText(getBaseContext(), R.string.ConnectionAlreadyExist,
                    Toast.LENGTH_LONG).show();
        } else {
            Log.d(TAG, "Service connection establishment failed,iConnResult="
                    + connResult);
            Toast.makeText(getBaseContext(), R.string.ConnectionFailure,
                    Toast.LENGTH_LONG).show();
        }
    }

    @Override
    public IBinder onBind(Intent intent) {
        Log.d(TAG, "onBind()");

        return mBinder;
    }

    public boolean sendHelloAccessory() {
        Log.d(TAG, "sendHelloAccessory()");

        boolean retvalue = false;
        String jsonStringToSend = "Hello Accessory!";

        if (mConnectionHandler != null) {
            try {
                mConnectionHandler.send(HELLOACCESSORY_CHANNEL_ID,
                        jsonStringToSend.getBytes());

                retvalue = true;
            } catch (IOException e) {
                e.printStackTrace();
            }
        } else {
            Log.d(TAG, "Requested when no connection");
        }

        return retvalue;
    }
```



```
    public void onPeerFound(SAPeerAgent remoteAgent) {
        Log.d(TAG, "onPeerFound enter");

        if (remoteAgent != null) {
            Log.d(TAG, "peer  agent is found  and  try to  connect");

            establishConnection(remoteAgent);
        } else {
            Log.d(TAG, "no peers  are  present  tell the UI");

            Toast.makeText(getApplicationContext(), R.string.NoPeersFound,
                    Toast.LENGTH_LONG).show();
        }
    }

    public boolean closeConnection() {
        if (mConnectionHandler != null) {
            mConnectionHandler.close();
            mConnectionHandler = null;
        } else {
            Log.d(TAG, "closeConnection: Called when no connection");
        }

        return true;
    }

    public boolean establishConnection(SAPeerAgent peerAgent) {
        if (peerAgent != null) {
            Log.d(TAG, "Making peer connection");
            requestServiceConnection(peerAgent);
            return true;
        }
        return false;
    }
}
```

HelloAccessoryActivity.java:

```
package com.samsung.android.example.helloaccessoryConsumer.ui;

import android.app.Activity;
import android.content.BroadcastReceiver;
import android.content.ComponentName;
import android.content.Context;
import android.content.Intent;
import android.content.IntentFilter;
import android.content.ServiceConnection;
import android.os.Bundle;
import android.os.IBinder;
import android.util.Log;
import android.view.View;
import android.widget.TextView;

import com.samsung.android.example.helloaccessoryConsumer.service.HelloAccessoryConsumerService;
import com.samsung.android.example.helloaccessoryConsumer.R;

public class HelloAccessoryActivity extends Activity {
    public static final String TAG = "HelloAccessoryActivity";
    static final String SAP_ACTION_ATTACHED = "android.accessory.device.action.ATTACHED";
    static final String SAP_ACTION_DETACHED = "android.accessory.device.action.DETACHED";
    private HelloAccessoryConsumerService mConsumerService = null;
    private boolean mIsBound = false;
    public static TextView mTextView;
```

```
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        Log.d(TAG, "HelloAccessoryActivity.onCreate()");

        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        mTextView = (TextView) findViewById(R.id.text1);

        doBindService();
        IntentFilter filter = new IntentFilter();
        filter.addAction(SAP_ACTION_ATTACHED);
        filter.addAction(SAP_ACTION_DETACHED);
        registerReceiver(mBroadcastReceiver, filter);
    }

    @Override
    protected void onDestroy() {
        Log.d(TAG, "HelloAccessoryActivity.onDestroy()");

        unregisterReceiver(mBroadcastReceiver);
        closeConnection();
        doUnbindService();
        super.onDestroy();
    }

    void doBindService() {
        mIsBound = bindService(new Intent(HelloAccessoryActivity.this,
                HelloAccessoryConsumerService.class), mConnection,
        Context.BIND_AUTO_CREATE);
    }

    void doUnbindService() {
        if (mIsBound) {
            unbindService(mConnection);
            mIsBound = false;
        }
    }

    public void mOnClick(View v) {
        switch (v.getId()) {
            case R.id.button1: {
                startConnection();
                break;
            }
            case R.id.button2: {
                closeConnection();
                break;
            }
            case R.id.button3: {
                sendHelloAccessory();
                break;
            }
        }
    }

    private void startConnection() {
        if (mIsBound == true && mConsumerService != null) {
            mTextView.setText("startConnection");
            mConsumerService.findPeers();
        }
    }

    private void closeConnection() {
        Log.d(TAG, "closeConnection(), mIsBound=" + mIsBound);
```

```
        if (mIsBound == true && mConsumerService != null) {
            mTextView.setText("closeConnection");
            mConsumerService.closeConnection();
        }
    }

    private void sendHelloAccessory() {
        if (mIsBound == true && mConsumerService != null) {
            mTextView.setText("sending HelloGear!");
            mConsumerService.sendHelloAccessory();
        }
    }

    BroadcastReceiver mBroadcastReceiver = new BroadcastReceiver() {
        @Override
        public void onReceive(Context context, Intent intent) {
            String action = intent.getAction();

            Log.d(TAG, "BroadcastReceiver.onReceive()");

            if (SAP_ACTION_ATTACHED.equals(action)) {
                Log.d(TAG, "doBindService()");

                doBindService();
            } else if (SAP_ACTION_DETACHED.equals(action)) {
                Log.d(TAG, "doUnbindService()");
                closeConnection();
                doUnbindService();
            }
        }
    };

    private final ServiceConnection mConnection = new ServiceConnection() {
        @Override
        public void onServiceConnected(ComponentName className, IBinder service) {
            Log.d(TAG, "onServiceConnected()");

            mConsumerService = ((HelloAccessoryConsumerService.LocalBinder) service)
                    .getService();
            mConsumerService.findPeers();
            mTextView.setText("onServiceConnected");
        }

        @Override
        public void onServiceDisconnected(ComponentName className) {
            Log.d(TAG, "onServiceDisconnected()");

            mConsumerService = null;
            mIsBound = false;
            mTextView.setText("onServiceDisconnected");
        }
    };
}
```

accessoryservices.xml:

```
<resources>
<application name="HelloAccessoryConsumer" >
<serviceProfile
    id="/system/helloaccessory"
    name="helloaccessory"
    role="Consumer"

    serviceImpl="com.samsung.android.example.helloaccessoryConsumer.service.HelloAccessoryConsumerService"
    version="1.0"
```

```
    serviceLimit="ANY"
    serviceTimeout="10">
    <supportedTransports>
        <transport type="TRANSPORT_BT" />
    </supportedTransports>
    <serviceChannel
        id="104"
        dataRate="Low"
        priority="Low"
        reliability="enable" >
    </serviceChannel>
</serviceProfile>
</application>
</resources>
```

3. Using the SA Class

The SA class provides the following methods:

- `initialize()` initializes Accessory. You need to initialize the Accessory package before you can use it. If the device does not support Accessory, SsdkUnsupportedException is thrown.
- `getVersionCode()` gets the Accessory version number as an integer.
- `getVersionName()` gets the Accessory version name as a string.
- `isFeatureEnabled()` checks if the Accessory package feature is available on the device.

```
SA SAPackage = new SA();

try{
        SAPackage.initialize (applicationContext) {
        boolean isFeatureEnabled = mAccessory.isFeatureEnabled(SA.DEVICE_ACCESSORY);
} catch (final SsdkUnsupportedException e) {
        //try to handle SsdkUnsupportedException
        if( processUnsupportedException(e) == true) {
            return;
        }
} catch (Exception e1) {
    /* Your application cannot use Accessory package of Samsung Mobile SDK.
     * You application should work smoothly without using this packages,
     * or you may want to notify user and close your app gracefully
     * (release resources, stop Service threads, close UI thread, etc.)
     */
}
```

3.1. Using the initialize() Method

The `SA.initialize()` method:

- Initializes the Accessory package.
- Checks if the device is a Samsung device.
- Checks if the device supports the Accessory package.
- Checks if the Accessory package libraries are installed on the device.

```
void initialize(Context context) throws SsdkUnsupportedException
```

If the Accessory package fails to initialize, the `initialize()` method throws an SsdkUnsupportedException exception. To find out the reason for the exception, check the exception message.

3.2. Handling SsdkUnsupportedException

If an SsdkUnsupportedException exception is thrown, check the exception message type using `SsdkUnsupportedException.getType()`.

The following types of exception messages are defined in the SA class:

- **DEVICE_NOT_SUPPORTED:** The device does not support the Accessory package.
- **LIBRARY_NOT_INSTALLED:** The device does not have the Accessory library installed.
- **LIBRARY_UPDATE_IS_REQUIRED:** The device must update the Accessory library.
- **LIBRARY_UPDATE_IS_RECOMMENDED:** The device is recommended to update the Accessory library.

3.3. Checking the Availability of Accessory Package Features

You can check if the Accessory package feature is supported on the device with the `isFeatureEnabled()` method. The feature types are defined in the SA class. Pass the feature type as a parameter when calling the `isFeatureEnabled()` method. The method returns a Boolean value that indicates the support for the feature on the device.

```
boolean isFeatureEnabled(int type)
```

4. Using the Accessory Package

The following chapter describes how to use the Accessory package.

4.1. Configuring Your Application

When you create your application, you must make the following additions to your Android manifest file and to your project:

1. Add permission for your service Provider or Consumer application to your Android manifest file to use the Samsung Accessory Service Framework.

```
<uses-permission android:name=”com.samsung.accessory.permission.ACCESSORY_FRAMEWORK”/>
```

2. Add your Service Provider or Consumer broadcast receivers for the intents handled by Accessory in your Android manifest file, inside the <application> element.

```
<receiver android:name
="com.samsung.android.sdk.accessory.ServiceConnectionIndicationBroadcastReceiver">
    <intent-filter>
    <action android:name="android.accessory.service.action.ACCESSORY_SERVICE_CONNECTION_IND"/>
</intent-filter>
</receiver>
<receiver android:name = "com.samsung.android.sdk.accessory.RegisterUponInstallReceiver">
<intent-filter>
    <action android:name="android.accessory.device.action.REGISTER_AFTER_INSTALL"/>
</intent-filter>
</receiver>
```

3. Add the path of your service profile XML file to your Android manifest file (for example, /res/xml/<profileName>.xml).

```
<meta-data android:name="AccessoryServicesLocation" android:value="/res/xml/<profileName>.xml"/>
```

4. Declare your Service Provider or Consumer class derived from SAAgent as a service in your Android manifest file. The SAAgent class extends the Android service and handles asynchronous Accessory-related intents. The SAAgent implementation executes all of its activities in a worker thread, which means it does not overload your application’s main thread.

```
<service android:name="com.samsung.accessory.alarmProvider.backend.SAAlarmProviderImpl"/>
```

4.2. Registering Your Service Provider or Consumer

Your Accessory Peer Agent implementations, both the Service Provider and Consumer applications, have to extend the SAAgent and SASocket base classes. These base classes allow you to focus on implementing your functionality and free you from managing the details of Accessory.

Register the Service Provider or Consumer with the Samsung Accessory Service Framework by specifying the Accessory Service Profile description. The Samsung Accessory Service Framework enters this in the local capability database. The Accessory capability exchange module advertises the services registered with the connected Accessory Devices.

The registration process expects the Accessory Service Profile description in the Service Profile XML file to be located in the /res/xml folder of your Android project. If your application implements multiple Service Providers or Consumers, declare multiple Accessory Service Profile descriptions in the Service Profile XML file. For more information, see the following Service Profile XML file example.

```
<resources>
<application name = "@string/app_name">
<serviceProfile
        serviceImpl="com.samsung.accessory.sacallProvider.backend.CallProviderServiceImpl"
        role="Provider"
        name="call_Provider"
        id="/system/call"
        version="1.0"
        serviceLimit ="any"
        serviceTimeout="10">
        <supportedTransports>
            <transport type="TRANSPORT_BT"/>
            <transport type="TRANSPORT_WIFI"/>
        </supportedTransports>
        <serviceChannel
            id="910"
            dataRate = "low"
            priority = "high"
            reliability= "enable"/>
</serviceProfile>
<serviceProfile
        serviceImpl="com.samsung.accessory.msgProvider.backend.MessageProviderImpl”
        role="Provider"
        name="message_service"
        id="/system/messages"
        version="1.0"
        serviceLimit ="any">
        <supportedTransports>
            <transport type="TRANSPORT_BT"/>
            <transport type="TRANSPORT_WIFI"/>
        </supportedTransports>
        <serviceChannel
            id="902"
            dataRate = "low"
            priority = "low"
            reliability= "disable"/>
</serviceProfile>
</application>
</resources>
```

- "application name": This attribute is the name that you want the Samsung Accessory Service Framework to advertise in the Accessory eco-system. Usually the application's Android AppName is used. You can implement multiple Service Providers and Consumers in one application. In that case, declare multiple <serviceProfile> elements inside the <application> element.
- In each <serviceProfile> element:
    - "serviceImpl" attribute is your subclass that extends SAAgent.
    - "role" attribute is "Provider" or "Consumer".
    - "name" attribute is the friendly name of your Service Provider or Consumer.
    - "id" attribute is the Service Profile ID of the Service Provider or Consumer.

- "version" attribute specifies the Service Profile specification version that your Service Provider or Consumer application supports.
- "serviceLimit" attribute sets how many accessory Peer Agents you want to connect with concurrently. If an Accessory Peer Agent requests a service connection with your application after you have reached limit, the Samsung Accessory Service Framework rejects the connection request. The attribute can be one of the following values:

  - one_ peeragent: Supports only one accessory peer agent.
  - one_ accessory : Supports only one Accessory Device, but can have connections to multiple Accessory Peer Agents on that Accessory Device.
  - any: Supports multiple Accessory Peer Agents on multiple Accessory Devices.

- "serviceTimeout" attribute controls the timeout for handling incoming service connection requests. This attribute is optional. If you do not set the value, the default timeout is applied. Use the default timeout unless your application needs prolonged time to make the decision to accept or reject incoming service connection requests. If it needs, for example, to connect to a cloud server, show a UI asking the user to decide, or needs do authentication, set this value for the timeout of the decision to accept or reject incoming service connection requests. If the timeout is exceeded, the requesting peer agent gets the response that service connection failed because your application did not respond.
- </supportedTransports> element declares the transports on which the Service Provider or Consumer is able to operate. The Samsung Accessory Service Framework supports the TRANSPORT_WIFI, TRANSPORT_BT, TRANSPORT_BLE, and TRANSPORT_USB transport types. If your Service Provider or Consumer supports multiple transport types, declare multiple <transports> elements.

  Note: The current version of the Samsung Accessory Service Framework supports only TRANSPORT_BT. Other types will be supported very soon.
- In each <serviceChannel> element:

  - "dataRate" attribute must be either "low" or "high".
  - "priority" attribute must be "low", "medium", or "high".
  - "reliability" attribute must be "enable" or "disable". The attribute defines whether you want a reliable transfer. In case of a packet drop, a reliable transfer re-transmits the packet (but also creates additional overhead).

When the application is installed, the Samsung Accessory Service Framework automatically registers its Accessory Peer Agents using the information specified in your Service profile XML file. Similarly, the Accessory Peer Agents are deregistered when the application is uninstalled. An error log is dumped if the registration process fails to register the Accessory Service Profile implementation.

4.2.1. Validating the Service Profile XML

The Samsung Accessory Service Framework Document Type Definition (DTD) schema validation significantly lowers the chances of registration failure. The following code snippet shows the Accessory Service Profile XML file DTD.

```
<!DOCTYPE resources [
<!ELEMENT resources (application)>
```

```
<!ELEMENT application (serviceProfile)+>
<!ATTLIST application name CDATA #REQUIRED>
<!ELEMENT serviceProfile (supportedTransports, serviceChannel+) >
<!ATTLIST application xmlns:android CDATA #IMPLIED>
<!ATTLIST serviceProfile xmlns:android CDATA #IMPLIED>
<!ATTLIST serviceProfile serviceImpl CDATA #REQUIRED>
<!ATTLIST serviceProfile role (Provider | Consumer) #REQUIRED>
<!ATTLIST serviceProfile name CDATA #REQUIRED>
<!ATTLIST serviceProfile id CDATA #REQUIRED>
<!ATTLIST serviceProfile version CDATA #REQUIRED>
<!ATTLIST serviceProfile serviceLimit
(any | one_peeragent | one_accessory) CDATA #IMPLIED>
<!ATTLIST serviceProfile serviceTimeout CDATA #IMPLIED>
<!ELEMENT supportedTransports (transport)+>
<!ATTLIST supportedTransports xmlns:android CDATA #IMPLIED>
<!ELEMENT transport EMPTY>
<!ATTLIST transport xmlns:android CDATA #IMPLIED>
<!ATTLIST transport type (TRANSPORT_WIFI|TRANSPORT_BT|TRANSPORT_BLE|TRANSPORT_USB) #REQUIRED>
<!ELEMENT serviceChannel EMPTY>
<!ATTLIST serviceChannel xmlns:android CDATA #IMPLIED>
<!ATTLIST serviceChannel id CDATA #REQUIRED>
<!ATTLIST serviceChannel dataRate (low | high) #REQUIRED>
<!ATTLIST serviceChannel priority (low | medium | high) #REQUIRED>
<!ATTLIST serviceChannel reliability (enable | disable ) #REQUIRED>
]>
```

Include the DTD validation rules at the very top of your Accessory Service Profile XML file:

- In the Eclipse IDE, under Eclipse setting: **Window > Preferences > XML > XML Files > Validation**, select **Enable markup validation**.
- Set **No grammar specified** and **Missing root element** to **Ignore**.

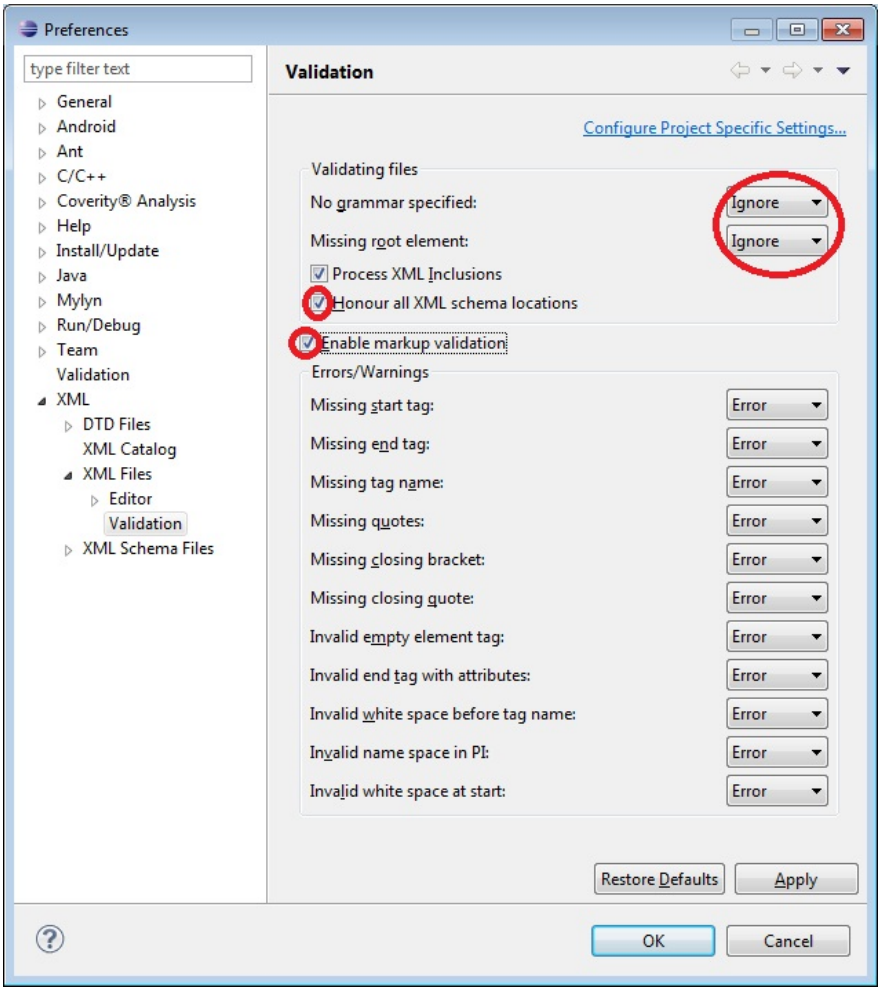

Figure 8: Eclipse IDE XML validation settings

Eclipse validates the Accessory XML file when you build your application to check whether the XML file follows the Samsung Accessory Service Framework DTD.

You can also validate the XML at any time by right-clicking on the XML file and selecting **Validate**.

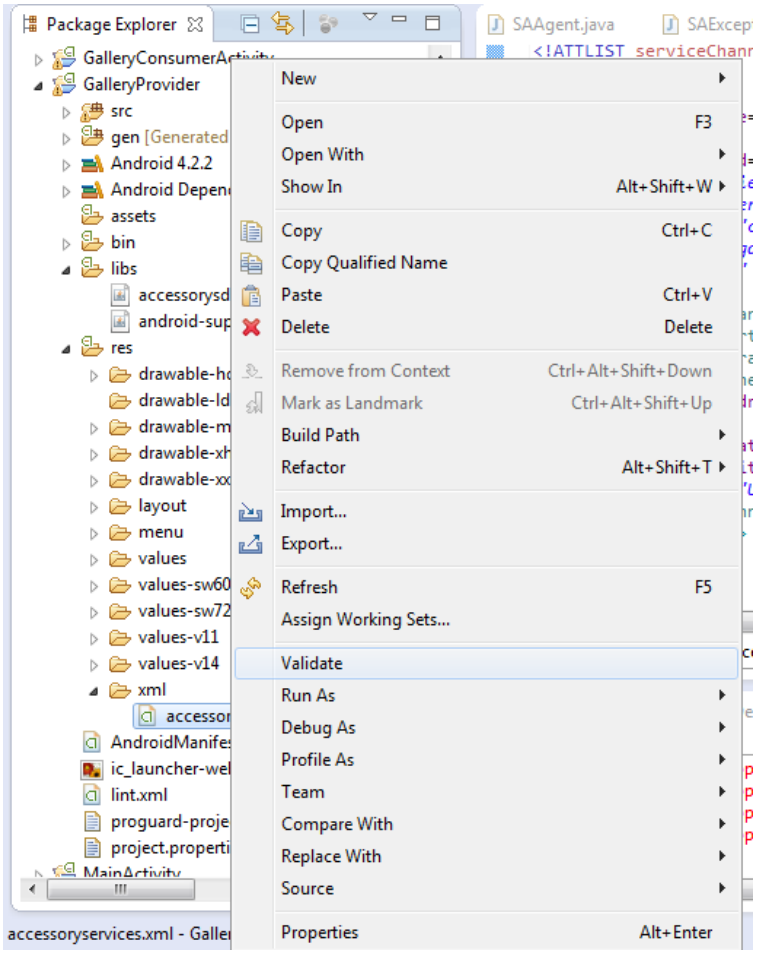

Figure 4: Eclipse IDE XML Validation

4.3. Finding a Matching Peer Agent and Initiating a Service Connection

Your Service Provider or Consumer application can search for matching Accessory Peer Agents by calling the `SAAgent.findPeerAgents()` method. Matching Accessory Peer Agents have the same Accessory Service Profile, for example, Notification Service or Weather Service, and have a complementary Provider or Consumer relationship with the calling Accessory Peer Agent. Accessory Peer Agents with different Accessory Service Profiles for Service Providers or Consumers do not "match" and cannot be connected with each other. If two Accessory Peer Agents have the same Accessory Service Profile with different versions, however, they are still considered to "match". A Notification Service Consumer that implements the Notification Service Profile version 2.0 and a Notification Service Provider that implements the Notification Service Profile version 1.0, for example, "match."

If a matching Accessory Peer Agent is found, the calling Accessory Peer Agent is notified with the `onPeerAgentAvailable(SAPeerAgent peerAgent)` callback method. If multiple matching Accessory Peer Agents are found, the callback occurs multiple times, one for each matching Accessory Peer Agent. If no Accessory Peer Agent is found, the calling Accessory Peer Agent is notified with the same callback, but the peerAgent parameter is null and the result parameter includes the reason for why no match was found.

If your application wants to establish a service connection with only one Accessory Peer Agent, check for the first callback. You can also check the identity or properties of the discovered Accessory Peer Agents by calling the methods provided by the SAPeerAgent class to decide with which Accessory Peer Agent you want to form a service connection.

You can initiate a service connection with an Accessory Peer Agent by calling requestServiceConnection(SAPeerAgent peerAgent). This method is called from a worker thread. If you need to do any heavy lifting or long latency work in this callback, spawn a separate thread.

```
@Override
protected void onFindPeerAgentResponse(SAPeerAgent peerAgent, int result) {
    if(result == PEER_AGENT_FOUND) {
        requestServiceConnection(peerAgent);
    } else if(result == FINDPEER_DEVICE_NOT_CONNECTED){
        // Show the Activity to user
        // asking them to connect the Accessory Device to Smart Device
        // Listen for Accessory Device intents,
        // On receiving intents, you can call findPeerAgents() again
    Log.i(TAG, "Peer Agents are not found, no accessory device connected.");
    } else if(result == FINDPEER_SERVICE_NOT_FOUND ) {
    Log.i(TAG, "No matching service on connected accessory.");
    }
}
```

If a Service Provider connects only with a specific service Consumer, or a Service Consumer with a specific Service Provider, the Service Provider and Consumer are known as ”companion apps”. When you only want to connect to a companion Service Provider or Consumer, call the methods provided by the SAPeerAgent class for specific information, such as model number or vendor information, before calling `requestServiceConnection()`. For example, when a photo printer Service Provider on an Accessory Device from a company only wants to connect to a photo printer Service Consumer on a Smart Device from the same company, they are companion apps.

After you have called `findPeerAgents()`, the Samsung Accessory Service Framework keeps tracking any changes in the availability of the matching Peer Agents for your application. If a change occurs, your application is notified with the `onPeerAgentUpdated(SAPeerAgent peerAgent, int code)` callback. This happens especially when an Accessory Device with a matching Peer Agent is connected or disconnected, or a matching Peer Agent is installed or uninstalled on a remote Accessory Device. If a matching Peer Agent is not found when calling `findPeerAgents()`, the `onFindPeerAgentResponse((SAPeerAgent peerAgent, int result)` callback gets a failure code. And later becomes available, you can get the PEER_AGENT_AVAILABLE with the `onPeerAgentUpdated(SAPeerAgent peerAgent, int code)` callback. Your application can check the identity or properties of the new Accessory Peer Agent by using the APIs in the SAPeerAgent object, and decide whether to request a service connection with that Accessory Peer Agent

```
@Override
protected void onPeerAgentUpdated(SAPeerAgent peerAgent, int result) {
if(result == PEER_AGENT_AVAILABLE) {
   requestServiceConnection(peerAgent);
 } else if (result == PEER_AGENT_UNAVAILABLE) {
    Log.i(TAG,"Peer Agent no longer available:" + peerAgent.getAppName());
     }
}
```

The remote Accessory Peer Agent accepts or rejects your service connection request. Your application is notified with the `onServiceConnectionResponse(SASocket socket, int result)` callback. The result of your service connection request is a request accepted and service connection established, a service connection request rejected, or a failure to establish a service connection for other reasons.

When a service connection is successfully established, the requesting accessory peer agent gets an instance of the SASocket object, which is used to handle service connection events and send data to or receive it from Accessory Peer Agents.

```
@Override
protected void onServiceConnectionResponse(SASocket socket, int result) {
    if(result == CONNECTION_SUCCESS) { //check whether success
        /* SACalendarConsumerConnection is SASocket derived object for this sample.
         * This is passed when Service Connection is established.
         */
        mSocket = (SACalendarConsumerConnection)socket;
    }else {
        Log.e(TAG,"Service Connection establishment failed" + result);
    }
}
```

4.4. Handling Service Connection Requests

The Service Provider or Consumer application is notified with the `onServiceConnectionRequested(SAPeerAgent peerAgent)` callback when remote Accessory Peer Agents want to create a service connection with it. The Accessory Peer Agent implementation can accept or reject service connection requests by calling the `acceptServiceConnectionRequested(SAPeerAgent peerAgent)` or `rejectServiceConnectionRequest(SAPeerAgent peerAgent)` method. The default implementation of the `onServiceConnectionRequested(SAPeerAgent peerAgent)` callback method is to always accept every incoming service connection request from any remote Accessory Peer Agent. Your Accessory Peer Agent implementation can override this method, usually to check the identity and properties of the requesting remote Accessory Peer Agent before accepting or rejecting incoming service connection requests.

The `onServiceConnectionRequested(SAPeerAgent peerAgent)` callback can check for Accessory Peer Agent specific information before accepting service connection requests. You can use the SAPeerAgent object methods for checking specific information, for example, application name or vendor ID. You can also authenticate the Peer Agent (checking its signatures), and then decide to accept or reject its service connection request.

Example of checking the Accessory Peer Agent information:

```
@Override
protected void onServiceConnectionRequested(SAPeerAgent peerAgent) {
    // make accept/reject decision by just checking info
    if(peerAgent.getAccessory().getVendorId.equals("Star Wars series")
       && peerAgent.getAccessory().getProductId.equals("Death Star")){
       acceptServiceConnectionRequest(peerAgent);
    } else {
```

```
        rejectServiceConnectionRequest(peerAgent);
}
```

Example of checking the Accessory Peer Agent signature:

```
@Override
protected void onServiceConnectionRequested(SAPeerAgent peerAgent) {
    // we also check Peer Agent's basic info
    if(peerAgent.getAccessory().getVendorId.equals("Star Wars series")
       && peerAgent.getAccessory().getProductId.equals("Death Star")){
        // we also authenticate Peer Agent for enhanced security
        authenticatePeerAgent(SAPeerAgent uPeerAgent);
    } else {
        rejectServiceConnectionRequest(peerAgent);
    }
}
@Override
onPeerAuthenticationResponse(SAPeerAgent peerAgent,Signature[] signatures,int code){
     // callback for calling authenticatePeerAgent, check Peer Agent's signature
     if(code == AUTHENTICATION_SUCCESS)
        && peerAgent.getAccessory().getVendorId.equals("Star Wars series")
        && peerAgent.getAccessory().getProductId.equals("Death Star")){

        for(Signature sig : signatures){
            // check whether the Peer Agent has Jedi Warrior's Signature
            if(sig.equals(JediWarriorSignature)){
                acceptServiceConnectionRequest(peerAgent);
                return;
            }
        }

        rejectServiceConnectionRequest(peerAgent);
     } else {
        rejectServiceConnectionRequest(peerAgent);
     }
}
```

If your application accepts the service connection request, your application is notified with the `onServiceConnectionResponse(SASocket socket, int result)` callback when the service connection is established or a failure occurs. On success, a SASocket object is passed with the callback. If you want to implement a Serivce Provider application that can serve multiple Service Consumer applications at the same time, keep a repository of the SASocket objects for all active service connections and give an identifier for each SASocket object. The `onServiceConnectionResponse(SASocket socket, int result)` callback is called from a worker thread. If you need to do any heavy lifting or long latency work in this callback, spawn a separate thread.

```
@Override
protected void onServiceConnectionResponse (SASocket socket, int result) {
    if(result == CONNECTION_SUCCESS){
        // Keep a repository of connected SASocket. This sample uses HashMap
    if(mConnectionsMap == null){
        mConnectionsMap=new HashMap<String,SACalendarProviderConnection>();
    }
```

```
    // SACalendarProviderConnection extends SASocket
    SACalendarProviderConnection calendarProviderConnection =
            (SACalendarProviderConnection) socket;
    // Assign unique identifier to each
    // SASocket(SACalendarProviderConnection) object
    calendarProviderConnection.mSocketId = mSocketCounter++;
    mConnectionsMap.put(String.valueOf(calendarProviderConnection.mSocketId),
        calendarProviderConnection);
    } else if(result == CONNECTION_FAILURE_NETWORK){
        for(;i<=5;i++){
        try {
            wait(1000);
        } catch (InterruptedException e) {
            e.printStackTrace();
        }
        Log.i(TAG, "Failed, Network Error.Try to re-request service Connection
                for " + i + "th time.");
        requestServiceConnection(peerAgent);
    }
    } else if (result == CONNECTION_FAILURE_PEER_AGENT_REJECTED) {
        Log.i(TAG, "Peer Agent Rejected");
    } else if (result == CONNECTION_FAILURE_PEER_AGENT_NO_RESPONSE) {
        Log.i(TAG, "Peer Agent no response");
    } else if (result == CONNECTION_FAILURE_DEVICE_UNREACHABLE) {
        Log.e(TAG, "Accessory Device not reachable, may already be disconnected");
    } else {
        Log.e(TAG, "Service Connection Fail, no-recoverable error");
    }
}
```

4.5. Exchanging Data with Accessory Peer Agents

Both Service Provider and Consumer applications implement a subclass of SASocket to send and receive data over an established service connection. Register your SASocket implementation with SAAgent by passing the name and the derived concrete SASocket subclass as parameters to the SAAgent constructor for Java Reflection construction.

```
public SmartViewServiceConnection() {
     //SmartViewConsumerService extends SAAgent
     //SmartViewServiceConnection extends SASocket
     super("SmartViewConsumerService", SmartViewServiceConnection.class);
}
```

Both the Service Provider and Consumer application also need to implement the SASocket subclass constructor for Java Reflection construction. The following example illustrates the implementation.

```
public SmartViewServiceConnection () {
    // SmartViewServiceConnection extends SASocket
    // name of the subclass extends SASocket
    super(SmartViewServiceConnection.class.getName());
 }
```

To send data to your connected Accessory Peer Agent, call the `send(int channelId, byte[] data)` method of the SASocket object (passed with the `onServiceConnectionResponse(SASocket socket, int`

result) callback) to send data on the selected service channel inside an established service connection. The Samsung Accessory Service Framework provides a datagram service. Either all the data is sent or nothing is sent. The service connection encapsulates all service channels as defined by the Accessory Service Profile Protocol specification.

```
try {
     mSocket.send(GALLERY_CHANNEL_ID, mJsonStringToSend.getBytes());
} catch (IOException e) {
     e.printStackTrace();
}
```

If you want your data encrypted, call secureSend() instead.

```
try {
     mSocket.secureSend(GALLERY_CHANNEL_ID, mJsonStringToSend.getBytes());
} catch (IOException e) {
     e.printStackTrace();
}
```

When your application receives data from a remote accessory peer agent, it is notified with the SASocket.onReceive(int channelId, byte[] data) callback. Implement the onReceive(int channelId, byte[] data) method to handle the data. This method is called from a worker thread. If you need to do any heavy lifting or long latency work in this callback, spawn a separate thread.

```
public class SmartViewServiceConnection extends SASocket{

    @Override
    public class onReceive(int channelId, byte[] data) {
        String str = new String(data);
        Log.i(TAG, "Received:" + str);
    }
}
```

4.6. Disconnecting and Error Handling

Call the close() method in the SASocket object to terminate the service connection with the remote Accessory Peer Agent. The remote Accessory Peer Agent is notified with the onServiceConnectionLost(int reason) callback and the Samsung Accessory Service Framework closes all the established service channels of the service connection. If a remote Accessory Peer Agent calls close() to terminate the service connection, your application is notified with the same callback.

If a service connection is lost, for example, due to a network failure or devices leaving the wireless connectivity range, the Accessory Peer Agents are notified with the onServiceConnectionLost(int reason) callback. You can handle these events by implementing the method illustrated in the following example.

```
@Override
public void onServiceConnectionLost(int reason) {
    /**
     * This function is called when Service Connection is broken or lost
```

```
     *  or peer disconnection
     */
     Log.e(TAG, "Service Connection Lost, Reason: "  + reason);
     activityBoundToTheService.handleConnectionLost(reason); //application logic
     switch(reason){
         case CONNECTION_LOST_DEVICE_DETACHED:
             //if the Peer Agent is killed because of LMK OOM,
             //better to call findPeerAgents() and request Service Connection
             //especially for Service Consumer, Accessory will invoke Peer Agent
             yourSAAgentImpl.tryConnect();
             // in your implementation of that method
             // you should follow the procedures talked in Section 4.3
             // “Find Matching Peer Agent and Initiate Service Connection”
             break;
         case CONNECTION_LOST_PEER_DISCONNECTED:
             // if device is out of range,
             // or connectivity(BT, WiFi etc) is turned off
             break;
         case CONNECTION_LOST_UNKNOWN_REASON:
             // this rarely happens, the error may be recoverable or not
             // you may want to call SAAgent.findPeerAgents(),
             // if found, you may want to re-connect
             yourSAAgentImpl.tryConnect();
             // in your implementation of that method
             // you should follow the procedures talked in Section 4.3
             // “Find Matching Peer Agent and Initiate Service Connection”
             break;
     }
}
```

Service Consumers and Providers are notified with the `SASocket.onError(int channelId, String errorMessage, int errorCode)` callback about errors related with service channel.

```
@Override
public void onError(int channelId, String errorMessage, int errorCode) {
    Log.e(TAG, "ERROR:” + errorMessage +
          “ on Channel " + channelId + " ErrorCode:" + errorCode);
    if(errorCode == ERROR_CONNECTION_CLOSED){
        Toast.makeText(getBaseContext(), "Data not sent, Service Connection closed",
            Toast.LENGTH_LONG).show();
    }
}
```

Your applications are notified with the `SAAgent.onError(String errorMessage, int errorCode)` callback about most other errors, such as errors related to the Samsung Accessory Service Framework and Accessory Peer Agents. For detailed error types, see the Accessory API Reference.

```
@Override
public void onError(String errorMessage, int errorCode) {
    Log.e(TAG, "ERROR:" + errorMessage +"ErrorCode:"+ errorCode);
    switch(errorCode){
        case ERROR_SDK_NOT_INITIALIZED:
        SA accessory = new SA();
        try {
            accessory.initialize(this);
        } catch (SsdkUnsupportedException e) {
        e.printStackTrace();
        }
        break;
```

```
    case ERROR_FATAL:
           // Samsung Accessory Service Framework died or binding failure
           // Fatal error, you need to stopping use Accessory package
           break;
    case ERROR_CONNECTION_INVALID_PARAM:
           // data cleared by user(in Settings-> Application Manager-> Clear data)
           // or data lost for other reasons
           // not run-time recoverable errors, reboot needed,
           / /you may want to exit the application
           break;
    }
}
```

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