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Introduction & Objectives

Bluetooth presents automotive manufacturers with a cost effective and versatile form of wireless connectivity. Bluetooth provides a short range (10-100m) wireless interface that enables Bluetooth enabled devices to connect to each other and establish an ad hoc network.

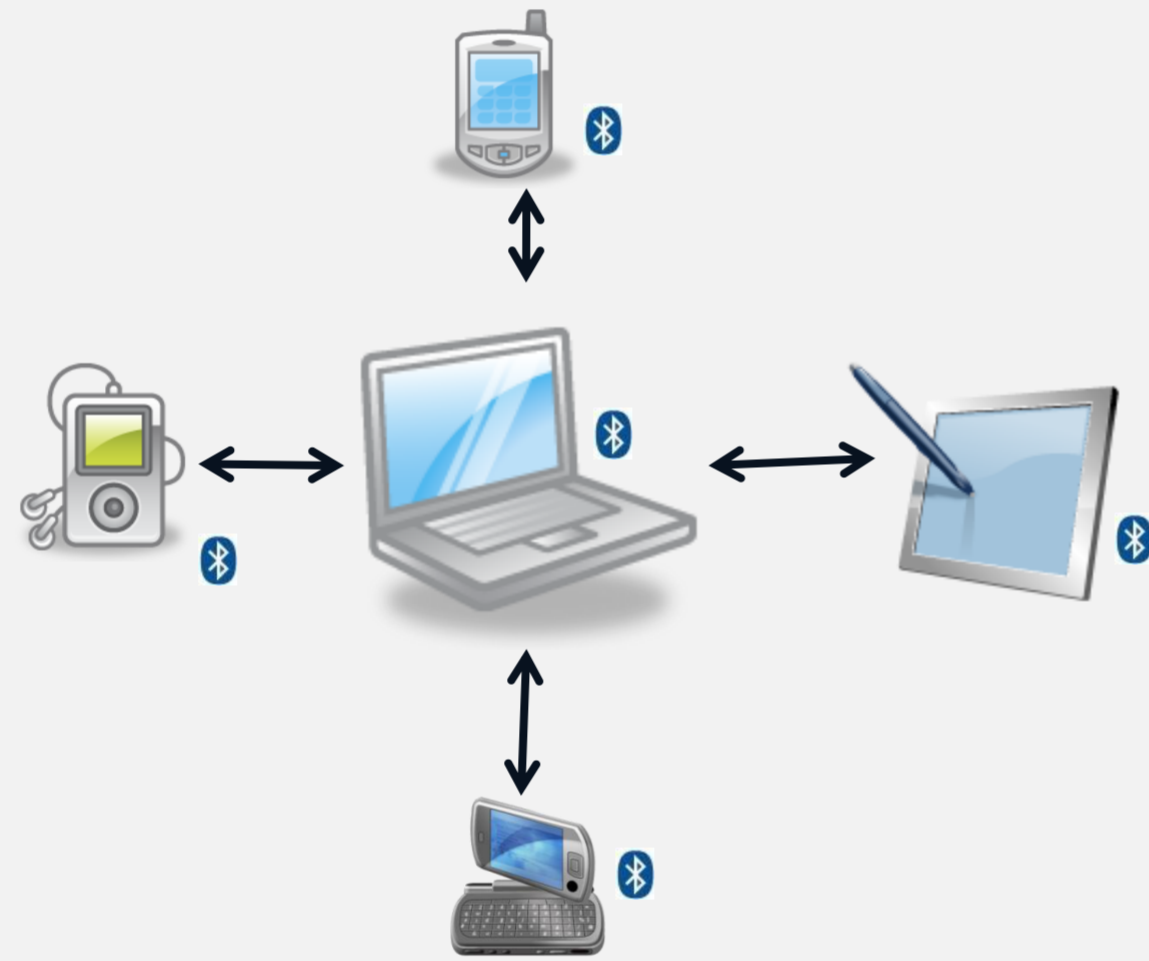
The **objective** of this project is to find the limits of an in-car Bluetooth network for seamless integration of mobile devices. The extended features tested were:

- Multiple device connections to the radio
- Metadata display of file name when streaming audio
- Remote access to a devices files

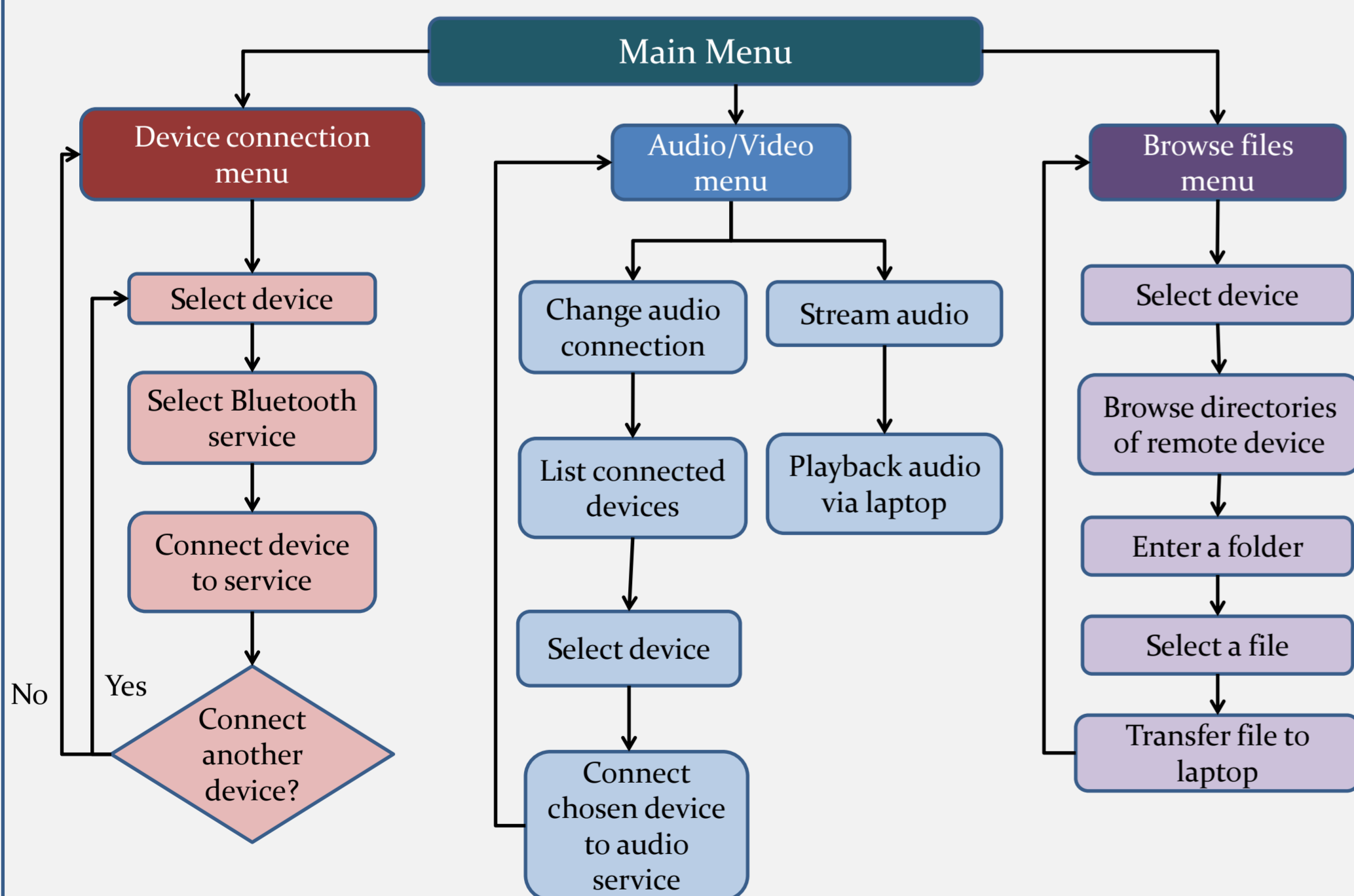
The in-car Bluetooth network

A desktop application was written to control Bluetooth connections and emulate the extended Bluetooth features.

The application created connected and communicated with various mobile devices such as mobile phones and tablets, as shown in the diagram on the right.



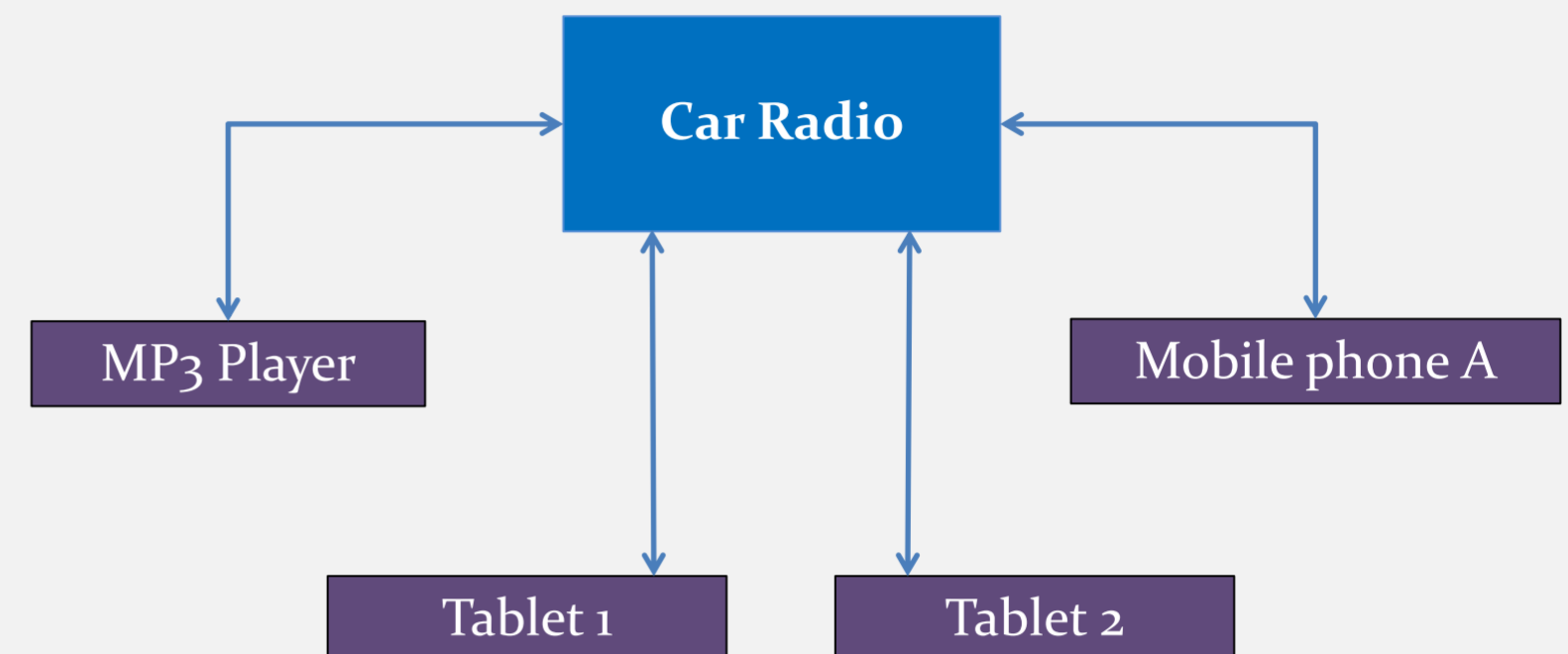
The below flow diagram describes the program flow of the Bluetooth application and the extended features implemented.



Results

Multiple device connection

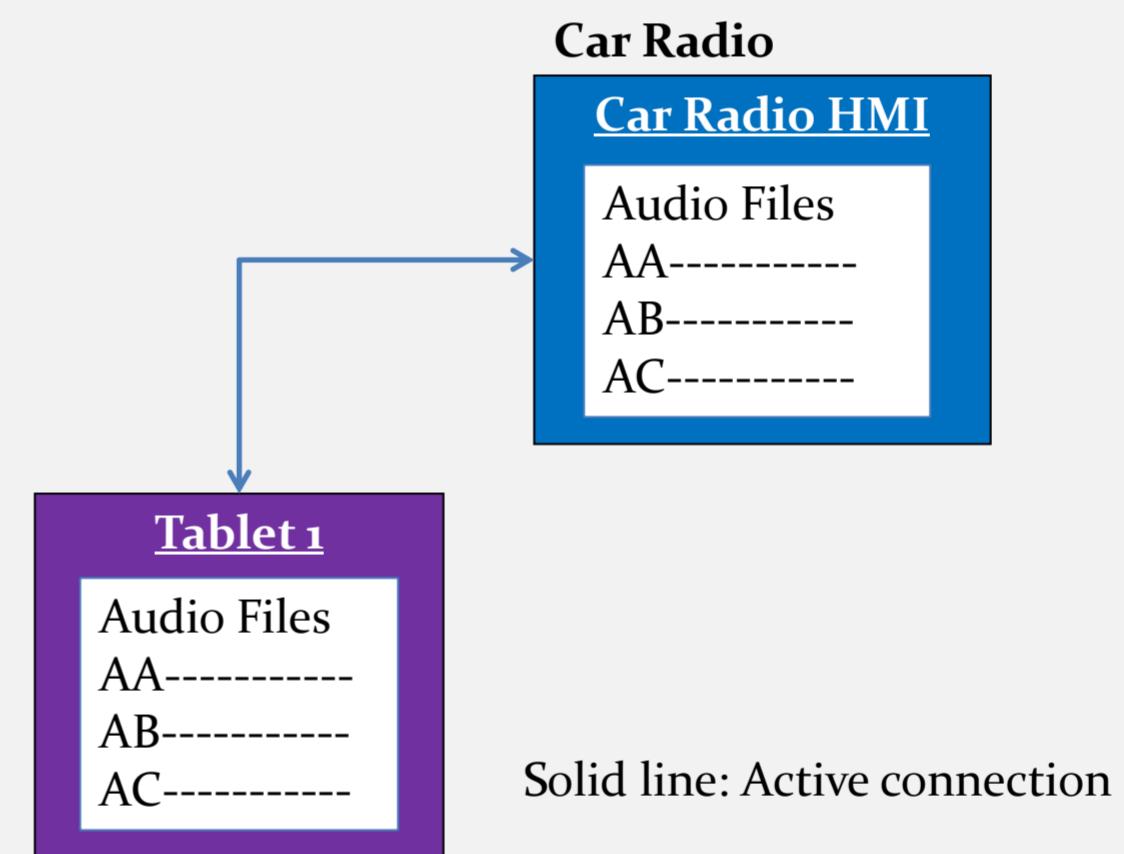
The in car Bluetooth network would look like the below diagram. Four devices were successfully connected to the desktop application simultaneously.



A limitation of Bluetooth technology is only one service can be used at any one time. For successful multiple device connection each device needs to connect to a different *service provided by the master device.

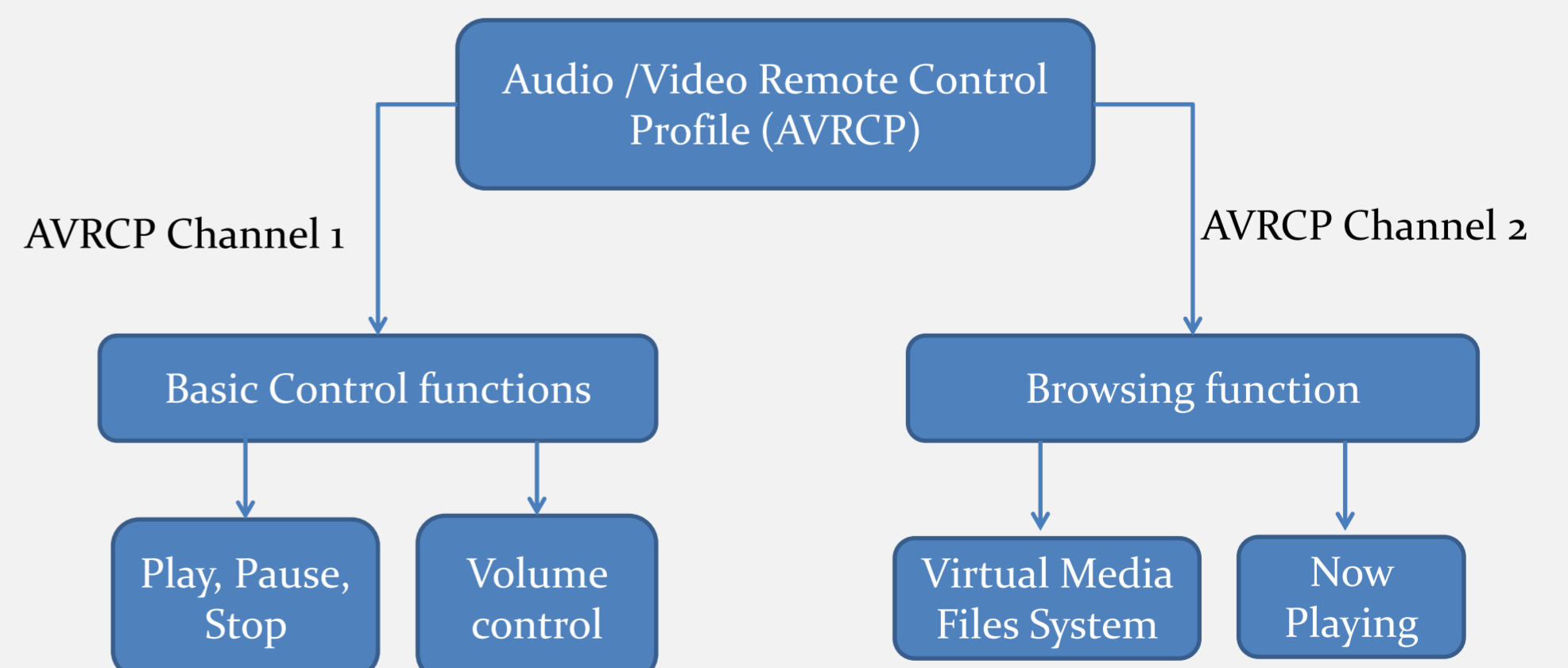
Metadata display and remote access to files

The diagram below illustrates this function:



The Bluetooth application accessed a remote devices files using the **File Transfer Profile (FTP)**. However, using this method means the radio must be capable of storing the selected media files, which is not desirable.

To enable file traversing in a manner suited for an automotive environment the audio/video remote control profile (AVRCP) version 1.4 must be used. AVRCP 1.4 supports file browsing and display of metadata for the currently streamed file. The below flow chart shows the functions AVRCP version 1.4 support.



*A **Bluetooth service** is a Bluetooth function provided by the radio for a remote device.