

AGL Telematics Connectivity Use Case Feasibility

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Introduction

The Automotive Grade Linux (AGL) Connectivity Expert Group (EG) has outlined some currently unsupported use cases:

1. Simultaneous connection of hardwired and Bluetooth phones.
2. Multiple simultaneous network connections in a telematics device, for example hardwired modem + Bluetooth telephony from a personal device + Wifi at the same time.
3. Multiple Bluetooth phones connected simultaneously, with support for multiple phone books / contacts.

This document will discuss the feasibility of implementing these and related use cases in AGL using its current software stack based on a recent investigation carried out by Matt Ranostay (matt.ranostay@konsulko.com) of Konsulko Group.

Simultaneous Hardwired and Bluetooth Connections

For the use case of simultaneous connection of a hardwired and a Bluetooth phone, it is currently believed based on code inspection and research that this is feasible with the current ofono and connman based stack in AGL for the scenario where the hardwired modem is only providing a data connection with no telephony support. However, this currently has not been tested in practice with the agl-service-telephony binding. For the additional use case of also having telephony support with the hardwired modem, there are two significant issues.

The first issue is that telephony support for hardware modems in ofono is extremely limited. During the time of the investigation, it was not possible to source hardware that works out of the box with ofono. There are out of tree patches to support telephony for some devices, but without investing significant effort, it is unclear how usable they would be. For example, patches for the Sierra Wireless modems can be found, but they were never integrated, and do not currently apply to the ofono tree. The only device that seems possibly usable at the moment is the SimCom SIM7100e modem used in the Purism Librem phone. A mPCIe card with the SIM7100e has just recently become [available](#), so it may be possible to source one and investigate further.

Another possibility that was investigated are patches to integrate the newer modemmanager [project](#) used by most mainstream Linux distributions with connman. Unfortunately, the work previously done by Google in this area is now quite outdated and would require significant

development effort to integrate into the current ofono tree. Separate upstream development to integrate modemmanager into connman as an alternative to ofono was dropped by the connman maintainer and any further work to do so seems unlikely to be accepted upstream. Overall, it is clear that from a product perspective most hardware modem choices will require software development to work with ofono, and in some cases that development may be significant.

Other than hardware support, the second issue is that currently the agl-service-telephony binding does not expose an API suitable for doing telephony with more than one modem. The development effort to add such support seems reasonable if required. However, if multiple voice modem functionality is added, some thought will need to be given to the design of the API to ensure it is secure, especially if there is a requirement to have different applications make calls using particular modems.

Multiple Network Connections

For the multiple network connection use case, anything beyond the currently supported management of a connection from one of a series of device types (Ethernet, Wifi, 3G) is currently non-trivial to implement due to connman limitations. With the connman configuration used by AGL at present, only one managed network connection is provided. This is essentially the primary use case for the majority of connman's user base. Providing more than one managed network connection involves using connman session support, which does not seem widely used or particularly well documented. It is quite unclear if configuring connman sessions will work for complicated use cases, and further investigation is required to explore this further. In any case, the agl-service-network binding currently does not support this functionality, so API definition and implementation development would be required to support multiple networks with connman or any alternate network manager.

Another connman limitation to note that is relevant to the multiple network connection use case is that it does not support more than one Bluetooth tether (i.e. PAN). It may potentially be possible to do so with session support if the tethers are split across sessions, but having a single managed connection multiplex Bluetooth tethers would require significant development work in connman.

Multiple Bluetooth Phone Connections

For the use case of multiple Bluetooth phone connections, the situation is somewhat more positive with regards to underlying system support than with the previous use cases. ofono does support multiple modems as indicated above, so it is likely not a limiting factor in this instance. It is possible that connman may require some development to avoid encountering issues with multiple Bluetooth devices, but this may be more manageable for a purely telephony oriented use case.

The agl-service-telephony, agl-service-bluetooth-pbap, and agl-service-bluetooth-map bindings currently do not support multiple Bluetooth devices, so they would all require development to add it, and as mentioned above in the hardwired and Bluetooth case, some effort would need to be invested up front into designing a secure API for managing multiple devices. Additionally, it is currently unclear how the multiple audio streams for simultaneous HFP and/or A2DP connections from multiple Bluetooth devices would be managed. This would require development beyond what is likely currently planned in the area of bluezalsa integration for pipewire, and would need someone familiar with the intended design for pipewire support to investigate further.