



Content hand-over Design issues

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## 13 Design issues for content hand-over

### 14 Creating new URI schemes (or not)

15 The W3C suggests [avoiding creation of new URI schemes](#)<sup>1</sup> but instead dispatch-  
16 ing instead on the type of the representation (i.e. the content-type). Creating  
17 new content-types is [substantially easier than it used to be](#)<sup>2</sup> and is compatible  
18 with sending those content-types via http or email.

19 [data:application/vnd.myapp.myobject,here-is-my-object](#) is one way to pass  
20 small bits of content-typed data around as URIs, but we should be careful not  
21 to overuse inline data.

22 Ascribing semantics to a subtree of http, like Apple does for [[https://developer.  
23 apple.com/library/ios/featuredarticles/iPhoneURLScheme\\_Reference/  
24 MapLinks/MapLinks.html#/apple\\_ref/doc/uid/TP40007899-CH5-SW1](#)”  
25 map links] in recent iOS, is another way to avoid new URI schemes.

### 26 D-Bus or not?

27 D-Bus has some subtleties for how it interacts with AppArmor: the caller of a  
28 method, or the sender of a signal, needs permission to send to the recipient (in  
29 its profile), and the recipient needs permission to receive from the sender (in  
30 \*its\* profile). We are trying to avoid relying on fine-grained message filtering  
31 (e.g. by interface) because that won't work on kdbus. This means we might  
32 have to work out something clever here if we want pairs of arbitrary apps from  
33 different app-bundles to be able to interact directly: we'd need either some way  
34 to have “equivalence classes” of apps, or a trusted D-Bus proxy that rate-limits  
35 and filters messages.

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<sup>1</sup><http://www.w3.org/TR/webarch/#URI-scheme>

<sup>2</sup><https://www.iana.org/form/media-types>

36 Another possibility would be for Didcot (or Canterbury) to proxy autho-  
37 rized requests between app-bundles; we could have the requester call a  
38 method on Didcot that results in Didcot calling `o.fd.Application.Open` or  
39 `o.fd.Application.Activate`<sup>3</sup> on the provider, if it considers the provider to be  
40 suitable.

41 This is fine for “launch” and “open URI”, but not really up to the job for a  
42 more complex interface (search-provider-style) or for an interface with more  
43 data (search results coming back). We could potentially have an API through  
44 which we fd-pass a socket, or pass through an abstract socket by name, or  
45 something, and then do D-Bus over that; but then we lose total ordering of  
46 messages, and become sad.

47 In the non-D-Bus corner, we could use a mesh of 1-1 connections between apps;  
48 but then we have a mesh of 1-1 connections between apps, we’ve still lost total  
49 ordering, and we potentially need to reinvent message framing.

50 smcv’s instinct here is to use D-Bus for everything that is a one-off action in  
51 response to something the user does; seriously consider using D-Bus for query-  
52 style APIs; and probably avoid D-Bus for TPEG, since that presumably already  
53 has framing, and we might end up doing the filtering navigation-app-side.

## 54 **Can we use GDesktopAppInfo rather than reinventing it?**

55 GAppInfo provides nice APIs for the basics of what Didcot does.

56 Unfortunately, it assumes that applications can be launched with direct D-Bus  
57 activation (not true if we are relying on Didcot for launching, unless we have  
58 additional infrastructure that helps us out) and that they have .desktop files.

59 Options:

- 60 • patch GDesktopAppInfo for Apertis
- 61 • write our own high-level API which will end up rather similar (potentially  
62 even identical), perhaps in its own LGPL-licensed library so it can copy  
63 bits from GDesktopAppInfo, and optionally patch GLib documentation  
64 to say not to use GDesktopAppInfo
- 65 • require that every app/agent is DBusActivatable, generate .desktop files  
66 from their manifests, and use a D-Bus proxy to transform activation re-  
67 quests into what we need
- 68 • generate .service files so that every app/agent `*is*` DBusActivatable, use  
69 a D-Bus proxy or clever AppArmor rules to make that work, and bypass  
70 Didcot entirely

## 71 **Should Didcot and Canterbury be the same thing?**

72 Canterbury is a trusted intermediary for launching apps. So is Didcot, if you  
73 think about it. Maybe they should merge?

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<sup>3</sup><http://standards.freedesktop.org/desktop-entry-spec/1.1/ar01s08.html>

## 74 **Maintaining established communications**

75 Do we have a use-case for this, that is not already satisfied by “list providers  
76 and start querying them again”?

## 77 **Registration mechanism**

78 It looks like we’re going to need:

- 79 • I handle foo: (scheme)
- 80 • I handle everything in foo://bar (scheme + authority)
- 81 • I handle everything starting with foo://bar/baz/ (scheme + authority  
82 – path-prefix) (?)
- 83 • I open files of type foo/bar
- 84 • I open files of type foo/\* (?)
- 85 • I open all files (?)
- 86 • I can share files of type foo/bar, foo/\* (?), all files

87 and for the streaming-ish use cases:

- 88 • I implement org.apertis.PointOfInterestProvider (etc.)

89 This is, not coincidentally, a lot like .desktop files. We could make the encoding  
90 in the manifest somewhat similar, and auto-generate a .desktop file if desired.  
91 Something like this (using YAML here because it’s easier to hand-write, apply  
92 the obvious mapping into JSON for production):

```
93 entry_points:      com.example.MyApp:      content_types:      -  
94 foo/bar           - foo/*          url_handler:        - "foo:"           -  
95 "foo://bar"       - "foo://bar/baz/"  com.example.MyAgent: implements:  
96 - org.apertis.PointOfInterestProvider
```

## 97 **Security considerations**

### 98 **URI scheme/media-type hijacking**

99 It is important to note that URI schemes and media types will, in general,  
100 be a “first come, first served” shared resource. The Scheme Hijacking attack  
101 described in [Unauthorized Cross-App Resource Access on MAC OS X and iOS](#)<sup>4</sup>  
102 §3.4 relies on the attacker registering for a URI scheme that an app developer  
103 had (mis)used as a general IPC mechanism.

104 One thing we can do to improve on iOS’ behaviour here is to provide IPC  
105 mechanisms that automatically convey app and user identity information that  
106 cannot be faked, such as D-Bus, and document them as a better way to solve  
107 the problems that iOS app developers are trying to solve by making up URI  
108 schemes.

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<sup>4</sup><https://drive.google.com/file/d/0BxxXk1d3yyuZOFIsdkNMSGswSGs/view?pli=1>

109 For example, there should be a way for a pair of cooperating applications to  
110 declare in their app-bundle manifests that each may communicate with the other  
111 via D-Bus. Executables in the same app-bundle should just be able to do D-Bus  
112 to each other anyway, no questions asked.

113 Documentation for the content handover feature should recommend these other  
114 IPC mechanisms, and caution against using content handover to transfer cre-  
115 dentials.

#### 116 **Bidirectional content handover**

117 One feature that was considered is bidirectional content handover. We recom-  
118 mend treating this as out-of-scope: it requires thought to be put into security  
119 between apps, and in particular what we want to allow apps to do. If general  
120 bidirectional channels between pairs of apps are required, they should use a  
121 protocol such as D-Bus or an AF\_UNIX socket, which provides secure authen-  
122 tication (credentials that cannot be faked, including the uid and AppArmor  
123 profile). ()

#### 124 **Terminating the launched app**

125 Suppose app A launches app B via content handover. One design question that  
126 was considered was whether app A should be able to terminate app B.

127 We recommend that this capability is not offered: if it was misused, it would be  
128 easy for a user to misinterpret it as app B crashing. ()