Freeway

Introduction and Overview

Freeway is a narrow software layer which maintains information about the location of objects on a network, in a decentralised fashion.

Objects are classified according to Freeway Type. At the Freeway level the attributes of an object are its name, location, an optional descriptor and an optional authentication value. All other characteristics are undefined.

Freeway itself only knows about the IP location of objects on the network. It is not concerned with how those objects may be accessed, or with any specific access control mechanisms. These areas are handled by higher-level type-specific application software, as needed. Each type will have a 'controlling' application.

Freeway types are created by Acorn as required : third parties may request a type via the usual defined channel for allocation requests. Each type has a unique identifier : for example, if there is a need for software to enable 'Bach partitas' to be shared across a network, then an available Freeway type number will be allocated by Acorn - e.g. 97=BachPartitas - and then the controlling application will be written to 'share' Bach partitas - whatever that means.

Technical Details

Type number

This is a 16-bit integer identifying a Freeway type. The following type numbers are allocated to Acorn Access+. (Informal names with no significance in software will also be allocated, for easier human reference)

Type	Informal name
1	Discs
2	Printers
5	Hosts

In Acorn Access, ShareFS is the controlling application for types Discs and Hosts, and !Printers is the controlling application for type Printers.

Object name

This is the name of an object.

An object name is unique within the set of objects of the same type within a site. Object names are terminated by a control character (and will return a terminator of zero on output), case independent, alphanumeric strings, created by users or application software. Maximum length is 64 bytes, including the terminator.

Object descriptor

This provides extra information about the object.

Its format is undefined at this level - it has significance to higher-level application software. Object descriptors are arrays of bytes of any value, maximum length 255.

In Acorn Access+ the descriptor for type Discs indicates whether a disc is shared protected or unprotected, or as a CDROM or subdirectory, and visible or invisible to other desktop users.

The descriptor for type Printers is a 'Printer Type' string.

The descriptor for type Hosts is null.

Object authentication value

Objects are either authenticated or unauthenticated. Authenticated objects require an authentication value to be provided before their attributes are made visible. An authentication value is a 32 bit integer. The authentication value of zero is reserved and should not be used.

Refresh interval

The Freeway software in each computer will periodically re-notify other computers about unauthenticated objects which are held by the local machine, so that they know that the objects continue to be accessible. This permits, for example, other machines to know when a computer holding Freeway objects has been powered down. The renotification period is called the "refresh interval", and is determined by the Freeway software and is typically 30 seconds.

Service calls

Service_FreewayStarting (Service Call &95)

Freeway is starting up

On entry

R1 = service call number
R2 = flags :

Bit(s)	Meaning
0-31	Reserved, must be 0

On exit

R1 preserved

Use

This service is issued when the Freeway module starts up. You may not call any Freeway SWIs during this service. If you wish to register with the module you should use a transient callback to do so.

Related services

Service_FreewayTerminating

Service_FreewayTerminating
(Service Call &96)

Freeway is terminating

On entry

R1 = service call number
R2 = flags :

Bit(s)	Meaning
0-31	Reserved, must be 0

On exit

R1 preserved

Use

This service is issued when the Freeway module is killed or shuts down for any other reason. You may not call any Freeway SWIs during this service.

Related services

Service_FreewayStarting (on page 4)

UpCalls

UpCall_Freeway
(UpCall &C)

State of Freeway objects has changed.

On entry

R0 = UpCall number
R1 = Reason code :

Value	Meaning
0	Object has been added
1	Object has been removed
2	Object attributes have changed
3	Local object deleted by Freeway

R2 = type number
R3 = pointer to object name, 0 terminated
R4 = length of object descriptor
R5 = pointer to object descriptor
R6 = IP address of device which holds or held this object

On exit

R0 - R6 preserved

Use

This call warns controlling applications that the named object has been
added, removed or changed. It is also issued when Freeway has detected
that the information held about a locally held object is unreliable, (as a
result of possible temporary name duplication, for example) and has
removed it unilaterally. It is issued on callback, and the contents of the
supplied name and descriptor buffers are guaranteed not to change
provided they are read from within the application's UpCall handler.

Related SWIs

SWI Freeway_Write (on page 9)

SWI calls

Freeway_Register
(SWI &47A80)

Register or deregister interest in objects of a given Freeway type.

On entry

R0 = flags :

Bit(s)	Meaning
0	0 - register interest
	1 - deregister interest
1	0 - interested in unauthenticated objects
	1 - interested in authenticated objects
2	0 - R3 not valid
	1 - R3 is pointer to type 'name' (<= 15 characters, 0 terminated)
3-31	reserved - must be set to 0

R1 = type number
R2 = authentication value if R0 bit 1 is set, otherwise undefined
R3 = pointer to type 'name' if R0 bit 2 is set, otherwise undefined

On exit

R0 - R3 preserved

Interrupts

Interrupts are undefined
Fast interrupts are enabled

Processor mode

Processor is in SVC mode

Re-entrancy

SWI is not re-entrant

Use

This SWI enables a controlling application to register interest in authenticated or unauthenticated objects of a particular Freeway type with the local Freeway software, and also to give a 'name' to that type (this name is of no significance to the software, it's just for the convenience of the human user). Freeway will hold information arriving from the network about a remote object only if one or more registrations of interest have been made locally in that object's type. If the object is authenticated then at least one of those registrations must have included an authentication value which matches the object's own. An error is returned if insufficient free memory exists.

Related SWIs

SWI Freeway_Write (on page 9)
SWI Freeway_Read (on page 11)

Freeway_Write
(SWI &47A81)

Add or remove an object of a given type.

On entry

R0 = flags :

Bit(s)	Meaning
0	0 - add object
	1 - remove object
1	1 - object is authenticated
2-31	reserved - must be set to 0

R1 = type number
R2 = pointer to object name, 0 terminated
R3 = length of object descriptor
R4 = pointer to object descriptor, or 0 for null descriptor, or when R0 bit 0 is set
R5 = object authentication value if R0 bit 1 is set, otherwise undefined

On exit

R0 - R5 preserved

Interrupts

Interrupts are undefined
Fast interrupts are enabled

Processor mode

Processor is in SVC mode

Re-entrancy

SWI is not re-entrant

Use

This SWI adds or removes a locally held object of a given type. If the object is unauthenticated then other computers are notified immediately, otherwise notification is withheld until a remote computer requests it. An error is returned if the type number is not known (i.e. if Freeway_Register has not been called with this type number), or if an object is added and a remote object of the given name and type already exists, or if an object is removed and no local object of the given name and type is currently held, or if no memory exists to store information about the object.

If R0 bit 0 is clear and the object named is already held as a local object, the object's descriptor and authentication value are updated if they differ from those passed to the SWI.

N.B.: Controlling applications should be prepared to receive upcall UpCall_Freeway, reason code object deleted, referring to any object previously added successfully via SWI Freeway_Write. This is to cover the possibility of Freeway deciding at any time that the information held about an object is unreliable and so deciding to remove it unilaterally, for any reason, e.g. if a remote object is created with the same name as a local object.

Related SWIs

SWI Freeway_Read (on page 11)

Freeway_Read
(SWI &47A82)

Read attributes of an object.

On entry

R0 = flags :

Bit(s)	Meaning
0	1 - authentication value provided
1-31	reserved - must be set to 0

R1 = type number
R2 = pointer to object name, 0 terminated
R3 = length of buffer for object descriptor
R4 = pointer to buffer for object descriptor, or 0 to read descriptor length
R5 = object authentication value if R0 bit 0 is set, otherwise undefined

On exit

R0 - R2 preserved
R3 = length of held object descriptor
R4 preserved
R5 = IP address of computer which holds the object

Interrupts

Interrupts are undefined
Fast interrupts are enabled

Processor mode

Processor is in SVC mode

Re-entrancy

SWI is not re-entrant

Use

This SWI reads information about the attributes of an object. The type number and object name must be provided. The SWI returns the IP address of the holder, and optionally the descriptor. The length of a held object descriptor may be read by setting R4=0 on entry. However in this case there is no guarantee that the object attributes will not have changed, or that the object will still exist, if the SWI is called again some time later with the same object name. An error is returned if the type number is unknown, or the object name is unknown, or if a supplied authentication value does not match the object's own authentication value, or if a supplied object descriptor buffer is too short; in this case the actual length is returned in R3.

Related SWIs

SWI Freeway_Write (on page 9)

Freeway_Enumerate
(SWI &47A83)

Enumerate objects of a given type.

On entry

R0 = flags :

Bit(s)	Meaning
0	0 - enumerate unauthenticated objects
	1 - enumerate authenticated objects
1-31	reserved - must be set to 0

R1 = type number

R2 = length of buffer for object name

R3 = pointer to buffer for object name, or 0 to read length of name

R4 = length of buffer for object descriptor

R5 = pointer to buffer for object descriptor, or 0 to read descriptor length

R6 undefined

R7 = enumeration context (0 to start)

R8 = object authentication value if R0 bit 0 is set, otherwise undefined

On exit

R0 preserved

R1 preserved

R2 = length of held object name, including terminator

R3 preserved

R4 = length of held object descriptor

R5 preserved

R6 = IP address of computer which holds the object

R7 = next enumeration context, or -1 if no more

R8 preserved

Interrupts

Interrupts are undefined

Fast interrupts are enabled

Processor mode

Processor is in SVC mode

Re-entrancy

SWI is not re-entrant

Use

This SWI allows a controlling application to enumerate currently held authenticated or unauthenticated objects of a given type, obtaining their names, location IP addresses, and descriptors if present. If an authentication value is provided then only those objects whose actual authentication value matches the supplied value are enumerated. If no authentication value is supplied then only unauthenticated objects are enumerated. The length of the held object name or descriptor may be read without filling in buffers by setting R3=0 or R5=0 respectively, on entry. However in this case there is no guarantee that the object attributes will not have changed, or that the object will still exist, if the SWI is called again some time later with the same enumeration reference.

If R7 is returned -1 then there were no further known objects of that type - the object name buffer will not have been filled in, and R6 is undefined.

An error is returned if the type number is unknown, or if a supplied name or descriptor buffer is too short. In the latter cases the actual name and descriptor lengths are returned in R2 and R4.

Related SWIs

SWI Freeway_Read (on page 11)

Freeway_Status
(SWI &47A84)

This SWI call is for internal use only. You must not use it in your own code.

Freeway_Serial
(SWI &47A85)

This SWI call is for internal use only. You must not use it in your own code.

*Commands

*FWShow

Show currently known unauthenticated objects

Syntax

```
*FWShow
```

Parameters

None

Use

This command is used to show the names and holder IP addresses of all unauthenticated objects of all types currently known about by this machine. Local objects are indicated via a leading asterisk.

Examples

```
*FWShow
```

Related SWIs

SWI Freeway_Enumerate (on page 13)

Document information

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History:	Revision	Date	Author	Changes
	1		ROL	Initial version