DTV APPLICATION SOFTWARE ENVIRONMENT LEVEL 1 (DASE-1)
PART 3: PROCEDURAL APPLICATIONS AND ENVIRONMENT

ATSC Standard

Note that this document is past the customary 5-year review point. No update of the document is in process.
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DASE-1 Procedural Applications and Environment

ATSC Standard

1. SCOPE

1.1 Status

This section describes the status of this document at the time of its publication. Other documents may supersede this document. The latest status of this document series is maintained by the ATSC.

This specification is an ATSC Standard, having passed ATSC Member Ballot on September 16, 2002. This document is an editorial revision of the Approved Proposed Standard (PS/100-3) dated November 5, 2002.

The ATSC believes that this specification is stable, that it has been substantially demonstrated in independent implementations, and that it defines criteria that are necessary for effective implementation and interoperability of Advanced Television Systems. A list of cumulative changes made to this specification may be found at the end of this document.

A list of current ATSC Standards and other technical documents can be found at http://www.atsc.org/standards.html.

1.2 Purpose

This specification defines an architecture and a collection of facilities by means of which procedural applications may be delivered in an ATSC data broadcast service to a procedural application environment embodied by a compliant receiver.

A procedural application is an organization of information which primarily uses procedural as opposed to declarative mechanisms to express its information content and behavior. An example of a procedural application is a Java TV™ Xlet composed of Java™ class files and embedded graphics, video, and audio.

A procedural application environment is a software environment which decodes and executes a procedural application. An example of a procedural application environment is a Java™ Virtual Machine and its associated APIs. An alternate name for a procedural application environment is application execution engine.

Note: In addition to supporting procedural applications, a procedural application environment supports features of declarative applications as defined by DASE-1 Part 2: Declarative Applications and Environment. In particular, a declarative application may make use of one or more embedded Xlets which make use of facilities defined by this specification.

1 The user’s attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to the validity of this claim, or of any patent rights in connection therewith. The patent holder has, however, filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license. Details may be obtained from the publisher.
1.3 Application

The architecture and facilities of this specification are intended to apply to terrestrial (over-the-air) broadcast systems and receivers. In addition, the same architecture and facilities may be applied to other transport systems (such as cable or satellite).

1.4 Organization

This specification is organized as follows:

- Section 1 Describes purpose, application and organization of this specification
- Section 2 Enumerates normative and informative references
- Section 3 Defines acronyms, terminology, and conventions
- Section 4 Specifies procedural application and environment behavior
- Section 5 Specifies procedural application and environment facilities
- Annex A Specifies Java types
- Annex B Specifies Java constants
- Annex C Specifies Java system properties
- Annex D Specifies Xlet context properties
- Annex E Specifies international resource support
- Changes Cumulative changes to specification

Unless explicitly indicated otherwise, all annexes shall be interpreted as normative parts of this specification.

This specification makes use of certain notational devices to provide valuable informative and explanatory information in the context of normative and, occasionally, informative sections. These devices take the form of paragraphs labeled as Example or Note. In each of these cases, the material is to be considered informative in nature.
2. REFERENCES

This section defines the normative and informative references employed by this specification. With the exception of Section 2.1, this section and its subsections are informative; in contrast, Section 2.1 is normative.

2.1 Normative References

The following documents contain provisions which, through reference in this specification, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All referenced documents are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the referenced document.

When a conflict exists between this specification and a referenced document, this specification takes precedence.

Note: This specification uses a reference notation based on acronyms or convenient labels for identifying a reference (as opposed to using numbers).

[A/53]
ATSC Digital Television Standard, A/53, ATSC

[DASE]
DASE-1 Part 1: Introduction, Architecture, and Common Facilities, A/100-1, ATSC

[DASE-API]
DASE-1 Part 4: Application Programming Interface, A/100-4, ATSC

[DASE-ZIP]
DASE-1 Part 5: ZIP Archive Resource Format, A/100-5, ATSC

[DOM2]
Document Object Model (DOM) Level 2 Core, Recommendation, W3C

[DOM2-EVENTS]
Document Object Model (DOM) Level 2 Events, Recommendation, W3C

[DOM2-HTML]
Document Object Model (DOM) Level 2 HTML, Recommendation, W3C

[DOM2-STYLe]
Document Object Model (DOM) Level 2 Style, Recommendation, W3C

[DOM2-VIEWS]
Document Object Model (DOM) Level 2 Views, Recommendation, W3C

[HAVI-UI]

[HAVI-UI-API]
[JAR]

[JAVATV]

[JAVATV-INTRO]

[JDK1.1.8]
Java Development Kit, Version 1.1.8, http://java.sun.com/products/jdk/1.1/, Sun Microsystems

[JDK1.2.2]

[JMF]

[JLS1]

[JVM1]

[JVM1-ERRATA]

[JVMX]

[LANG-TAGS]
Tags for the Identification of Languages, RFC3066, IETF

[MIME-MEDIA]
Multimedia Internet Mail Extensions (MIME) Part Two: Media Types, RFC2046, IETF

[PJAE]

[UNICODE]
Unicode Character Encoding Standard, Version 3.2, Unicode Consortium
2.2 Informative References

[JNI]

[JLS1-ERRATA]

[JVM2]

2.3 Reference Acquisition

ATSC Standards
Advanced Television Systems Committee (ATSC), 1750 K Street N.W., Suite 1200 Washington, DC 20006 USA; Phone: +1 202 828 3130; Fax: +1 202 828 3131; http://www.atsc.org/.

IETF Standards
Internet Engineering Task Force (IETF), c/o Corporation for National Research Initiatives, 1895 Preston White Drive, Suite 100, Reston, VA 20191-5434, USA; Phone: +1 703 620 8990; Fax: +1 703 758 5913; http://www.ietf.org/.

HAVi Standards
The HAVi Organization, 2694 Bishop Drive, Suite 275, San Ramon, CA 94583, USA; Phone: +1 925 275 6615; Fax: +1 925 275 6691; http://www.havi.org/.

ITU Standards
International Telecommunication Union (ITU), Place des Nations, CH-1211 Geneva 20, Switzerland; Phone: +41 22 730 51 11; Fax: +41 22 733 72 56; http://www.itu.ch/.

Java Standards
Sun Microsystems, Inc., 901 San Antonio Road, Palo Alto, CA 94303 USA; http://java.sun.com/.

Unicode Standards
The Unicode Consortium, P.O. Box 391476, Mountain View, CA 94039-1476, USA; Phone: +1 650 693 3921; Fax: +1 650 693 3010; http://www.unicode.org/.
W3C Standards

World Wide Web Consortium (W3C), Massachusetts Institute of Technology, Laboratory for Computer Science, 200 Technology Square, Cambridge, MA 02139, USA; Phone: +1 617 253 2613; Fax: +1 617 258 5999;
http://www.w3.org/.
3. DEFINITIONS

This section defines conformance keywords, acronyms and abbreviations, and terms as employed by this specification.

All acronyms, abbreviations, and terms defined by [DASE] apply to this specification. Only those acronyms, abbreviations, and terms specific to this document and not common to DASE in its entirety are defined herein.

3.1 Conformance Keywords

As used in this document, the conformance keyword *shall* denotes a mandatory provision of the standard. The keyword *should* denotes a provision that is recommended but not mandatory. The keyword *may* denotes a feature whose presence does not preclude compliance, that may or may not be present at the option of the content author or the procedural application environment implementer.

3.2 Acronyms and Abbreviations

bslbf  Bit Serial Leftmost Bit First
DAVIC  Digital Audio Video Council
HAVi   Home Audio Video Interoperability
JDK    Java Development Kit
JMF    Java Media Framework
PTS    Presentation Time Stamp
STC    System Time Clock
uimsbf Unsigned Integer Most Significant Bit First

3.3 Terms

active object content: a category of content types which includes both application/java and application/javatv-xlet content types.

embedded Xlet: an Xlet that was loaded as a result of processing a markup content entity referenced by a declarative application; an embedded Xlet is specified by means of an XDML object element.

primary Xlet: the first Xlet that was loaded as a result of processing a procedural application’s initial entity.

secondary Xlet: any Xlet explicitly registered and started by a primary Xlet, an embedded Xlet or another secondary Xlet.

Xlet: an element of active object content expressed as a Java class which implements the javax.tv.xlet.Xlet interface; a collection of Java class files and possibly related resources, one class file of which implements the javax.tv.xlet.Xlet interface; a collection of resources packaged as a Java archive which embodies the functionality of an Xlet.
4. BEHAVIOR

This section describes certain normative behavior for DASE Applications and Systems which employ the facilities defined by this specification.

4.1 State and Status Management

A procedural application environment shall support generic state and status management functions in adherence with [X.731] as extended and restricted by this specification. Furthermore, any DASE application which employs a Java TV Xlet shall maintain and report Xlet state and status information as described in the following subsections.

4.1.1 State Attributes

A procedural application environment shall support the following state attributes in accordance with [X.731] Clauses 7.1 and 8.1.1:

- operational
- usage
- administrative

State attributes are scalar valued. The value of a state attribute shall be exactly one of the values permitted for the attribute.

4.1.1.1 operational state

The operational state shall support the semantics of the following values in accordance with [X.731] Clauses 7.1.1 and 8.1.1.1:

- enabled
- disabled

Unless specified otherwise, the initial value of the operational state shall be enabled.

Note: See [DASE-API] interface org.atsc.management.OperationalState for information on support of the operational state.

4.1.1.1.1 Use with Xlets

An Xlet should report changes in its operational state to the procedural application environment. The procedural application environment and other Xlets shall not rely upon an Xlet reporting changes in its operational state.

4.1.1.2 Use with Environment Resources

Every environment resource provided by a procedural application environment which implements state management facilities shall maintain and report changes in its operational state.

Note: See [DASE-API], org.atsc.management.ObjectStates, for information on how an environment resource maintains and reports state changes.

A procedural application environment shall provide an interface to determine the overall operational state of the procedural application environment.

Note: See [DASE-API], org.atsc.system.Receiver, for information on how an environment’s operational status is exposed to DASE applications.
4.1.1.2 **usage state**

The usage state shall support the semantics of the following values in accordance with [X.731] Clauses 7.1.2 and 8.1.1.2:

- *idle*
- *active*
- *busy*

Unless specified otherwise, the initial value of the usage state shall be *idle*.

*Note:* See [DASE-API] interface `org.atsc.management.UsageState` for information on support of the usage state.

4.1.1.2.1 Use with Xlets

An Xlet should report changes in its usage state to the procedural application environment. The procedural application environment and other Xlets shall not rely upon an Xlet reporting changes in its usage state.

An Xlet whose operational state is *enabled* but which is not providing a service should report a usage status of *idle*. If an Xlet is *enabled* and is busy providing service or is otherwise not able to provide service, it should report a usage status of *busy*. If an Xlet is *enabled*, able to provide a service, but awaiting a client for its service, it should report a usage status of *active*.

An enabled Xlet whose purpose is not to provide a service to a client should report a constant usage state of *busy*.

*Note:* See [DASE-API], `org.atsc.xlet.XletContextExt.stateChanged`, for information on how an Xlet reports state changes.

4.1.1.2.2 Use with Environment Resources

Every environment resource provided by a procedural application environment which implements state management facilities shall maintain and report changes in its usage state.

*Note:* See [DASE-API], `org.atsc.management.ObjectStates`, for information on how an environment resource maintains and reports state changes.

A procedural application environment shall provide an interface to determine the overall usage state of the procedural application environment.

*Note:* See [DASE-API], `org.atsc.system.Receiver`, for information on how an environment’s usage status is exposed to DASE applications.

4.1.1.3 **administrative state**

The administrative state shall support the semantics of the following values in accordance with [X.731] Clauses 7.1.3 and 8.1.1.3:

- *locked*
- *unlocked*
- *shutting down*

Unless specified otherwise, the initial value of the administrative state shall be *unlocked*.

*Note:* See [DASE-API] interface `org.atsc.management.AdministrativeState` for information on support of the administrative state.
4.1.1.3.1 Use with Xlets

A procedural application environment shall maintain the *administrative* state of each Xlet; an Xlet shall not be permitted to alter its *administrative* state.

*Note:* The determination of when a procedural application environment can or must transition the *administrative* state of an Xlet is not defined by this specification; furthermore, an Xlet is not required to take any action as a result of a transition in this state.

4.1.1.3.2 Use with Environment Resources

Every environment resource provided by a procedural application environment which implements state management facilities shall maintain and report changes in its *administrative* state.

*Note:* See [DASE-API], org.atsc.management.ObjectStates, for information on how an environment resource maintains and reports state changes.

A procedural application environment shall provide an interface to determine the overall *administrative* state of the procedural application environment.

*Note:* See [DASE-API], org.atsc.system.Receiver, for information on how an environment's *administrative* status is exposed to DASE applications.

4.1.2 Status Attributes

A procedural application environment shall support the following status attributes in accordance with [X.731] Clauses 7.2 and 8.1.2:

- *alarm*
- *procedural*
- *availability*

Status attributes are set valued. If none of the specified attribute values applies, then a status attribute shall have the special value *none*.

4.1.2.1 *alarm* status

The *alarm* status shall support the semantics of the following values in accordance with [X.731] Clause 8.1.2.1:

- *under repair*
- *critical*
- *major*
- *minor*
- *alarm outstanding*

Unless specified otherwise, the initial value of the *alarm* status shall be *none*.

*Note:* See [DASE-API] interface org.atsc.management.AlarmStatus for information on support of the *alarm* status.

4.1.2.1.1 Use with Xlets

An Xlet should report changes in its *alarm* status to the procedural application environment. The procedural application environment and other Xlets shall not rely upon an Xlet reporting its *alarm* status.
4.1.2.1.2 Use with Environment Resources

Every environment resource provided by a procedural application environment which implements status management facilities shall maintain and report changes in its alarm status.

Note: See [DASE-API], org.atsc.management.ObjectStates, for information on how an environment resource maintains and reports status changes.

A procedural application environment shall provide an interface to determine the overall alarm status of the procedural application environment.

Note: See [DASE-API], org.atsc.system.Receiver, for information on how an environment’s alarm status is exposed to DASE applications.

4.1.2.2 procedural status

The procedural status shall support the semantics of the following values in accordance with [X.731] Clause 8.1.2.2:

- initializing
- initialization required
- not initialized
- reporting
- terminating

Unless specified otherwise, the initial value of the procedural status shall be none.

Note: See [DASE-API] interface org.atsc.management.ProceduralStatus for information on support of the procedural status.

4.1.2.2.1 Use with Xlets

An Xlet should report changes in its procedural status to the procedural application environment. The procedural application environment and other Xlets shall not rely upon an Xlet reporting its procedural status.

Prior to performing Xlet.initXlet, a procedural application environment shall initialize an Xlet’s procedural status to not initialized.

During the performance of Xlet.initXlet, an Xlet should report its procedural status as initializing. Upon successful completion of initialization, an Xlet should report an empty procedural status.

During the performance of Xlet.destroyXlet, an Xlet should report its procedural status as terminating.

Note: See [DASE-API], org.atsc.xlet.XletContextExt.statusChanged, for information on how an Xlet reports status changes.

4.1.2.2.2 Use with Environment Resources

Every environment resource provided by a procedural application environment which implements status management facilities shall maintain and report changes in its procedural status.

Note: See [DASE-API], org.atsc.management.ObjectStates, for information on how an environment resource maintains and reports status changes.
A procedural application environment shall provide an interface to determine the overall procedural status of the procedural application environment.

*Note:* See [DASE-API], `org.atsc.system.Receiver`, for information on how an environment’s procedural status is exposed to DASE applications.

### 4.1.2.3 availability status

The availability status shall support the semantics of the following values in accordance with [X.731] Clause 8.1.2.3:

- in test
- failed
- power off
- off line
- off duty
- dependency
- degraded
- not installed
- log full

Unless specified otherwise, the initial value of the availability status shall be none.

*Note:* See [DASE-API] interface `org.atsc.management.AvailabilityStatus` for information on support of the availability status.

#### 4.1.2.3.1 Use with Xlets

An Xlet should report changes in its availability status to the procedural application environment. The procedural application environment and other Xlets shall not rely upon an Xlet reporting its availability status.

An Xlet which cannot provide its intended service(s) due to unavailability of a critical resource should report dependency in its availability status. An Xlet which can provide limited service due to unavailability of a critical resource should report degraded in its availability status.

An Xlet which performs a periodic function should report off duty in its availability status when not performing its intended function.

An Xlet which is undergoing testing should report in test in its availability status. An Xlet which has incurred a non-recoverable error should report failed in its availability status.

An Xlet should not report power off in its availability status.

*Note:* See [DASE-API], `org.atsc.xlet.XletContextExt.statusChanged`, for information on how an Xlet reports status changes.

#### 4.1.2.3.2 Use with Environment Resources

Every environment resource provided by a procedural application environment which implements status management facilities shall maintain and report changes in its availability status.

*Note:* See [DASE-API], `org.atsc.management.ObjectStates`, for information on how an environment resource maintains and reports status changes.

A procedural application environment shall provide an interface to determine the overall availability status of the procedural application environment.
Note: See [DASE-API], org.atsc.system.Receiver, for information on how an environment’s availability status is exposed to DASE applications.

### 4.2 Xlet Lifecycle Management

An Xlet shall exhibit a lifecycle as prescribed by [JAVATV-INTRO], Chapter 7, Application Lifecycle.

*Note:* The terminology used by [JAVATV-INTRO] assumes that an individual Xlet corresponds one-to-one with an individual application. This correspondence does not necessarily hold within a DASE Application, which permits the use of multiple Xlets.

The overall lifecycle of a DASE Application is specified in [DASE], Section 5.1.3, Application Lifecycle. Transitions in a DASE Application’s lifecycle shall affect the lifecycle of individual Xlets loaded by the application in accordance with Table 1 Application Lifecycle State Mapping.

#### Table 1 Application Lifecycle State Mapping

<table>
<thead>
<tr>
<th>Application Lifecycle</th>
<th>Xlet Lifecycle Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>during <em>initialized</em> state</td>
<td>initXlet()</td>
</tr>
<tr>
<td>enter <em>active</em> state</td>
<td>startXlet()</td>
</tr>
<tr>
<td>enter <em>suspended</em> state</td>
<td>pauseXlet()</td>
</tr>
<tr>
<td>enter <em>uninitialized</em> state</td>
<td>destroyXlet()</td>
</tr>
</tbody>
</table>

*Note:* No necessary relationship holds between an Xlet’s lifecycle state and its X.731 state attribute values.

If a DASE Application makes use of multiple Xlets, then the *pause* and *destroy* mappings described above shall be applied to each *secondary* Xlet followed by each *embedded* Xlet or the *primary* Xlet, depending upon whether the application is a declarative or procedural application, respectively.

*Note:* The internal order of applying this mapping in the case of multiple secondary Xlets or multiple embedded Xlets is not defined.

*Note:* See Section 3.3 for definitions of *primary*, *secondary*, and *embedded* Xlets.

An Xlet may directly change its lifecycle state in certain cases: (1) an Xlet may pause itself by invoking XletContext.notifyPaused(); and (2) it may cause its destruction by invoking XletContext.notifyDestroyed().

An Xlet which is paused may request that it be resumed (i.e., transitioned from paused to active states) by invoking XletContext.resumeRequest(). A procedural application environment is not required to satisfy a resume request, and may, instead, choose to leave the Xlet in a paused state or transition it to the destroyed state. However, if a procedural application environment can resume an Xlet which requests resumption and no administrative reason exists for keeping it suspended, then it should honor the request.

If a *primary* Xlet is destroyed, then the procedural application environment shall terminate the procedural application which resulted in the loading of this Xlet. Otherwise, Xlet state changes need not have a direct impact on a DASE Application’s lifecycle.

### 4.3 Trigger Processing

A procedural application environment shall process trigger content as defined by [DASE], Section 6.9. Trigger content may declare one or more events of a specific type which require processing by a procedural application environment. A procedural application environment shall process all events with a *type* attribute of the following value:
• generic

### 4.3.1 Event Processing

An event whose type is defined as requiring processing by a procedural application environment is processed by creating an instance of the `org.atsc.trigger.TriggerEvent` class and dispatching this instance to applicable event listeners which implement the `org.atsc.trigger.TriggerListener` interface.

*Note:* No synchronization semantics hold for triggers as defined herein; that is, the decoding of triggers as well as any presentation side effects are considered to be asynchronous with respect to the application delivery system’s clock.

*Note:* See [DASE-API] for the definition of the `org.atsc.trigger` package.

#### 4.3.1.1 bubbles attribute

This attribute shall be ignored by a procedural application environment.

*Note:* See [DASE], Section 6.9.1.6.1.1, for more information on this attribute.

#### 4.3.1.2 cancelable attribute

This attribute shall be ignored by a procedural application environment.

*Note:* See [DASE], Section 6.9.1.6.1.2, for more information on this attribute.

#### 4.3.1.3 target attribute

This attribute shall have a value of which takes the form of a non-empty, application-defined string. The event shall be dispatched to (1) all trigger event listeners which specified an identical target string when the listener was registered and (2) all trigger event listeners which were registered without a target string.

The value of this attribute shall be treated as case-insensitive for the purpose of determining value equality.

*Note:* See [DASE], Section 6.9.1.6.1.3, for more information on this attribute.

*Note:* In the case of a DASE Application which makes use of multiple Xlets, a trigger event is dispatched to all appropriate trigger listeners of each Xlet. The order of dispatching to multiple Xlets is not defined by this specification.

### 4.3.2 Generic Event Processing

An event whose type attribute has a value of "generic" shall be processed as a generic event.

The generic event type provides support for arbitrary, pre-defined actions to be triggered in active object content under the control of the application emitter. The parameter set of an event of this type is not restricted in either names or values.

When a generic event is processed, the following steps shall occur:

1. All event parameters consisting of name and value pairs shall be extracted from trigger content and used to instantiate an instance of `java.util.Properties`;
2. The event’s target attribute shall be extracted from trigger content;
3. An instance of `org.atsc.trigger.TriggerEvent` shall be instantiated using the above information;
4. The trigger event instance shall be dispatched to all applicable listeners.
**4.4 Relative Identifier Resolution**

A procedural application employs resource identifiers in order to reference various types of application resources in a variety of contexts. These identifiers take a form as described by [DASE], Section 5.1.2.3.1, *Resource Identifiers*. A reference to a resource may take an absolute or a relative form as described by [DASE], Section 5.1.2.3.2, *Resource References*. When a resource reference takes a relative form, the following interpretive rules shall be applied.

Given a relative identifier, the base identifier to be used to absolutize the relative identifier shall be determined by the following rules:

1. for a relative identifier used with the constructor `java.net.URL(String)`, use the base identifier of the URI which corresponds to the external form of the current Xlet's locator;
2. for a relative identifier used with the constructor `java.net.URL(URL,String)`, use the rules described by this constructor’s defining specification;
3. for a relative identifier used with the constructor `javax.media.MediaLocator(String)`, use the base identifier of the URI which corresponds to the external form of the current Xlet's locator;
4. for a relative identifier used with the method `javax.tv.locator.LocatorFactory.-createLocator(String)`, use the base identifier of URI which corresponds to the external form of the current Xlet's locator.

If none of the above rules permits resolution of a relative identifier, then an attempt shall be made to use rule three as specified by [DASE], Section 5.1.2.3.2.1, *Relative Resource Identifiers*.

**4.5 Relative Name Resolution**

A procedural application may directly or indirectly make use of relative names for referring to certain application resources or system defined resources. The procedures for resolving these relative names are described in the following subsections.

**4.5.1 File System Names**

Certain constructors of the `java.io.File` class as well as certain methods, e.g., `java.awt.Toolkit.getImage(String)`, permit the use of a relative name in order to designate a pathname with respect to some explicit or implied directory. If no directory context is provided, then a relative file name shall be resolved as follows:

1. if the application is associated with exactly one application delivery file system, then a relative file name shall be resolved with respect to the mount point of that application delivery file system;
2. if the application is associated with multiple application delivery file systems, then a relative file name shall be resolved with respect to the mount point of the first mounted application delivery file system;
3. otherwise, a relative file name shall be resolved with respect to the root directory of the local file system.

**4.5.2 Java Class Names**

The resolution of Java types requires the implied loading of Java class files. When resolving a reference to an application-defined Java class or interface, the value of the application’s `classpath` parameter shall be used to create a search list for resolving the fully qualified class name.

*Note:* See Section 5.1.1.1.3 for more information on resolving class names using the classpath.
When resolving a reference to a system-defined Java class or interface, the value of the application's `classpath` parameter shall not be used; rather, a separate, implementation-defined classpath shall be used to create a search list for resolving the fully qualified class name.

For the purpose of mapping a fully qualified Java class name to a file name or resource identifier, each "." appearing in the class name shall be changed to an appropriate separator character and the extension ".class" shall be appended as a suffix.

*Note:* The appropriate separator character will depend upon the file or resource access protocol being employed; e.g., when the class file is being loaded from a file system, the value of `java.lang.System.getProperty("file.separator")` is used, when the class file is being loaded from an archive resource, the file or pathname separator employed by the archive resource format is used, etc.

### 4.5.3 Java Resource Names

When a relative name is used with one of the following methods, the same rules used to resolve an application-defined Java class name (as described above in Section 4.5.2) shall apply:

- `java.lang.ClassLoader.getResource(String)`
- `java.lang.ClassLoader.getResourceAsStream(String)`

When a relative name is used with one of the following methods, the same rules used to resolve a system-defined Java class name (as described above in Section 4.5.2) shall apply:

- `java.lang.ClassLoader.getSystemResource(String)`
- `java.lang.ClassLoader.getSystemResourceAsStream(String)`

### 4.6 Local File System

A procedural application environment should provide local file system storage for use by DASE Applications which employ active object content types.

A DASE System may purge local file system storage usage at the discretion of either the end-user or the system itself. A purge of the local file system shall not occur during a period that a DASE Application is in a state other than the *uninitialized* state.

*Note:* This specification does not define either the minimum local file system size or the minimum persistence of files created within this file system beyond the lifecycle of an application.

If a DASE Application creates a directory or file in a local file system, then it should employ the following convention to reduce potential collisions of directory and file names: an application should create files in a directory whose pathname corresponds to the reversed namespace and path of the base identifier of the application's root resource; for example, if the base identifier is "lid://xyz.com/app1/", then the pathname "/com/xyz/app1/" should be used.

If a local file system is employed by a DASE System to retain persistent information other than directories or files explicitly created by a DASE Application, then this persistent information shall not be exposed to a DASE Application by means of local file system functionality. Any attempt by a DASE Application to access such information shall cause a runtime exception to be raised.
5. FACILITIES

This specification defines a number of facilities, each of which defines a category of content types by enumerating a set of one or more specific content types. The following categories are defined:

- active object content
- application defined content
- text content
- java archive content

A procedural application environment shall implement all the facilities specified in this section, and both procedural application and declarative application entities may use these facilities.

Note: See DASE-1 Part 2: Declarative Applications and Environment, Section 5.1.6.8.1, Active Content Object Element, for more information on the use of these facilities by a declarative application.

5.1 Active Object Content

This facility consists of a primary active object content type, application/java, and a specialized form of this content type, application/javatv-xlet. Every procedural application shall contain one or more application entities which take the form of these active object content types. In particular, the initial entity of a procedural application shall take the form of the specialized active object content type, application/javatv-xlet.

If the initial entity of a procedural application is a content type other than application/javatv-xlet and this application is invoked, then the procedural application environment shall abort the application.

5.1.1 application/java

This active object content type shall adhere to [JVM1], Chapter 4, Class File Format, as extended and restricted below and shall be identified as content type application/java.

An application resource of this content type shall specify a Java class file version number in the range 45.3 through 45.65535.

A Java class file whose version is 45.4 or higher may make use of the following extensions as defined by [JVMX]:

- InnerClasses attribute
- Synthetic attribute

5.1.1.1 Java Virtual Machine

A procedural application environment shall execute active object content in a manner consistent with [JVM1], as amended by [JVM1-ERRATA] and [JVMX], and as further clarified and constrained below.

The Java Virtual Machine shall support Java class files whose version numbers are in the range 45.3 through 45.65535.

When a class is resolved by the Java Virtual Machine, all superclasses (or superinterfaces) shall be resolved.

The Java Virtual Machine may use either eager (early or static) or lazy (late) resolution of symbolic references; however, if eager resolution would result in an error condition, then any
exception produced by such condition shall not be raised until the execution of the first Java
virtual machine instruction which requires resolution to succeed.

*Note:* A Java Virtual Machine which performs eager resolution must appear to applications
to operate as if it performs lazy resolution. See [JLS1], Section 12.3, *Linking of Classes
and Interfaces*, for additional information.

If the target of an `invokeinterface` instruction does not support the referenced interface
and the instruction is executed, then a `java.lang.IncompatibleClassChangeError` shall be
raised as described by [JLS1] Section 13.1.

The Java Virtual Machine is *not* required to support class finalization as required by [JVM1],
Section 2.16.8.

*Note:* Implementers are advised to carefully review [JLS1-ERRATA], *Java Language
Specification Clarifications*, and [JVM2], *Summary of Clarifications and Amendments*, for
important information regarding Java Virtual Machine semantics.

A procedural application environment is not required to implement support for Java to native
compilation services. If a procedural application environment does implement such services, then
it shall do so in a manner that is transparent to the processing of an application entity with the
exception of differences in elapsed execution time.

### 5.1.1.1.1 Byte Code Verification

A procedural application environment shall verify `application/java` content as a Java
class file according to [JVM1], Section 4.9, *Verification of Class Files*, and [JLS1], Sections 12.1.2
and 12.3.1.

If an entity of an Xlet uses content type `application/java`, does not correctly verify
according to [JVM1], Section 4.9, then the procedural application environment shall not execute
the entity, shall raise an appropriate runtime exception, and, if the exception is not caught, shall
destroy the Xlet.

### 5.1.1.1.2 Java Native Interface (JNI)

The Java Native Interface may be, but need not be implemented by a procedural application
environment; furthermore, an application entity shall not rely on the presence of support for this
functionality.

*Note:* See [JNI] for further information on the Java Native Interface.

### 5.1.1.1.3 Classpath

A procedural application environment shall load application-defined Java class files, i.e.,
application resources of active object content types, by performing an ordered search of the
entries specified by an Xlet’s *effective classpath*, as partially determined by the containing
application’s *classpath* parameter.

*Note:* See [DASE], Section 6.1.1.6.13.2, for more information on how an application’s
*classpath* parameter is specified in a DASE Application.

The value of an application’s *classpath* parameter shall take the form of a (possibly empty)
list of entries, where each entry specifies either (1) a base URI or (2) the URI of a resource of an
archive content type, and where multiple entries are separated by the token “;”.

*Note:* The token used to delimit entries in the application specified *classpath* parameter is
typically converted to an implementation dependent *path separator* token during the
process of parsing the parameter.
If no classpath parameter is specified or if its value is an empty string, then it shall be considered to have been specified with a value taking the form of a single entry consisting of the base URI of the application’s root resource.

For a primary Xlet, the effective classpath shall be the value of the classpath parameter as determined above.

For an embedded Xlet, the non-empty value of the codebase attribute of the referencing XDM object element shall be prepended to the value of the classpath parameter as determined above with an appropriate, intervening path separator token. The resulting value shall be treated as the effective classpath of the embedded Xlet.

Note: See DASE-1 Part 2: Declarative Applications and Environment, Section 5.1.1.6.8, for more information about the XDM object element and its codebase attribute.

For a secondary Xlet, the effective classpath shall be the same as the effective classpath of the Xlet which starts the secondary Xlet.

A procedural application environment shall not use an Xlet’s effective classpath to search for or load system (non-application) defined Java class files. Furthermore, a procedural application environment shall not load any Java class file from any portion of a local file system which is exposed to a DASE application for read or write access.

Note: See Section 5.4 below for more information on Java archive content types.

Example: Given the fully qualified Java class name com.acme.Class, and given the following effective classpath:

"lid://acme.com/myxlet.jar;lid://acme.com/myxlet/"

then the procedural application environment would search for the class file using the following URIs in the order indicated:

1. "lid://acme.com/myxlet.jar!/com/acme/Class.class"
2. "lid://acme.com/myxlet/com/acme/Class.class"

5.1.1.2 Java Application Programming Interfaces

An application entity which adheres to this content type may use and a procedural application environment shall implement the following application programming interfaces (APIs) as specified in the following subsections:

- Personal Java Application Environment (PJAE)
- Java Media Framework (JMF)
- Java Television (Java TV)
- Home Audio Video Interoperability User Interface (HAVi UI)
- Digital Audio Video Council (DAVIC)
- W3C Document Object Model (DOM)
- DASE Specific (ATSC)

A procedural application environment is not required to implement any deprecated Java class, interface, method, or field; furthermore, an application entity shall not rely upon the presence of support for such deprecated functionality.

An application entity shall not synchronize on any system class or upon any system static object.

If the specification of a Java class does not define any constructor, then the implementation of the class shall explicitly define either a package or private constructor in order to prevent the generation of a default constructor.
5.1.1.2.1 Personal Java Application Environment (PJAE) Interfaces

An application entity which adheres to this content type may use and a procedural application environment shall support the use of Personal Java Application Environment APIs in a manner consistent with [PJAE], [JDK1.1.8], and [JDK1.2.2] as extended and restricted below.

If an application entity of this content type requires resolution of a reference to a PJAE class for which support is not required and which is not present in a procedural application environment, then the procedural application environment shall raise a `java.lang.NoClassDefFoundError`, and, if the exception is not caught by the application, shall destroy the Xlet in whose context this reference occurs.

If an application entity of this content type invokes a PJAE method for which support is not required and which is not present in a procedural application environment, then the procedural application environment shall raise a `java.lang.NoSuchMethodError`, and, if the exception is not caught by the application, shall destroy the Xlet in whose context this reference occurs.

If an application entity of this content type invokes a PJAE method for which support is not required and which is partially implemented in the sense that the method is present in, but its semantics are not supported by a procedural application environment, then the procedural application environment should raise a `java.lang.UnsupportedOperationException`, and, if the exception is not caught by the application, shall destroy the Xlet in whose context this reference occurs.

If an application entity of this content type requires resolution of a reference to a PJAE field for which support is not required and which is not present in a procedural application environment, then the procedural application environment shall raise a `java.lang.NoSuchFieldError`, and, if the exception is not caught by the application, shall destroy the Xlet in whose context this reference occurs.

If a PJAE optional class or method designated to be not required by this specification is implemented, then it shall be implemented according to [PJAE].

Note: See [PJAE], Section 3, Definitions, for the meaning of optional as used in the above paragraph.

A procedural application environment shall use the values of constants defined in ANNEX B in the case that a PJAE defined constant field does not specify a value.

Note: See Annexes A.1 through A.13 for all required PJAE types.

5.1.1.2.1.1 Modified PJAE Required Features

The following PJAE required features are modified or restricted by this specification:

- `java.awt` package, [PJAE], Section 5.2
- `java.awt.event` package, [PJAE], Section 5.4
- `java.awt.image` package, [PJAE], Section 5.5
- `java.beans` package, [PJAE], Section 5.7
- `java.io` package, [PJAE], Section 5.8
- `java.lang` package, [PJAE], Section 5.9
- `java.net` package, [PJAE], Section 5.12
- `java.security` package, [PJAE], Section 5.17
- `java.text` package, [PJAE], Section 5.23
- `java.util` package, [PJAE], Section 5.25
- `java.util.zip` package, [PJAE], Section 5.27
5.1.1.2.1.1.1 Modifications to and Constraints on `java.awt` package

The following types in the `java.awt` package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these types:

- Button
- Canvas
- Checkbox
- CheckboxGroup
- CheckboxMenuItem
- Choice
- Dialog
- Event
- FileDialog
- Frame
- GridBagLayoutInfo
- Label
- List
- Menu
- MenuBar
- MenuComponent
- MenuContainer
- MenuItem
- MenuShortcut
- Panel
- PopupMenu
- PrintGraphics
- PrintJob
- Scrollbar
- ScrollPane
- SystemColor
- TextArea
- TextComponent
- TextField
- Window

*Note:* The above excluded functionality is satisfied by HAVi UI functionality. See Section 0.

5.1.1.2.1.1.1.1 Modifications to `java.awt.AWTEvent` class

The following constructor in the `java.awt.AWTEvent` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this constructor:

- `AWTEvent(Event)`

5.1.1.2.1.1.1.2 Modifications to `java.awt.AWTEventMulticaster` class

The following methods in the `java.awt.AWTEventMulticaster` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `save(ObjectOutputStream, String)`
- `saveInternal(ObjectOutputStream, String)`
5.1.1.2.1.1.1.3 Modifications to java.awt.BorderLayout class

The following deprecated method in the java.awt.BorderLayout class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- addLayoutComponent(String, Component)

5.1.1.2.1.1.1.4 Modifications to java.awt.CardLayout class

The following deprecated method in the java.awt.CardLayout class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- addLayoutComponent(String, Component)

5.1.1.2.1.1.1.5 Constraints on java.awt.Color class

The following constraints shall apply to the constant fields specified by java.awt.Color:

- black == new Color ( 0, 0, 0 )
- blue == new Color ( 0, 0, 255 )
- cyan == new Color ( 0, 255, 255 )
- darkGray == new Color ( 64, 64, 64 )
- gray == new Color ( 128, 128, 128 )
- green == new Color ( 0, 255, 0 )
- lightGray == new Color ( 192, 192, 192 )
- magenta == new Color ( 255, 0, 255 )
- orange == new Color ( 255, 200, 0 )
- pink == new Color ( 255, 175, 175 )
- red == new Color ( 255, 0, 0 )
- white == new Color ( 255, 255, 255 )
- yellow == new Color ( 255, 255, 0 )

5.1.1.2.1.1.1.6 Modifications to java.awt.Component class

The java.awt.Component class is not required to implement the java.awt.MenuContainer interface; however, the getFont() method specified by java.awt.Component shall be implemented by a procedural application environment.

The following deprecated methods in the java.awt.Component class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- action(Event, Object)
- bounds()
- deliverEvent(Event)
- disable()
- enable()
- enable(boolean)
- getPeer()
- gotFocus(Event, Object)
- handleEvent(Event)
- hide()
- inside(int, int)
- keyDown(Event, int)
- keyUp(Event, int)
- layout()
The following methods in the `java.awt.Component` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `add(PopupMenu)
- `list()
- `list(PrintStream)
- `list(PrintStream, int)
- `list(PrintWriter)
- `list(PrintWriter, int)
- `paramString()
- `print(Graphics)
- `printAll(Graphics)
- `remove(MenuComponent)

The following method in the `java.awt.Component` class shall be present in a procedural application environment; however, its semantics are not required to be fully implemented by a procedural application environment. Furthermore, an application entity shall not rely on the presence of support for the full semantics of this method:

- `setCursor(Cursor)`

If a procedural application environment cannot fulfill the semantics of this method and this method is invoked, then a `java.lang.UnsupportedOperationException` should be raised, and, if the exception is not caught by the application, the application shall be aborted.

5.1.1.2.1.1.1.7 Modifications to `java.awt.Container` class

The following deprecated methods in the `java.awt.Container` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `add(String, Component)
- `countComponents()
- `deliverEvent(Event)
- `insets()"
• layout()
• locate(int,int)
• minimumSize()
• preferredSize()

The following methods in the java.awt.Container class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:
• addImpl(Component,Object,int)
• list(PrintStream,int)
• list(PrintWriter,int)
• printComponents(Graphics)

5.1.1.2.1.1.1.8 Modifications to java.awt.Dimension class

The java.awt.Dimension class should override the method java.lang.Object.-
hashCode() in order to conform to semantic interdependencies with java.lang.Object.-
equals(Object).

5.1.1.2.1.1.1.9 Modifications to java.awt.Font class

The following method in the java.awt.Font class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:
• getPeer()

5.1.1.2.1.1.1.10 Modifications to and Constraints on java.awt.FontMetrics class

The following deprecated method in the java.awt.FontMetrics class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:
• getMaxDecent()

The following method shall employ the default platform character encoding system when interpreting the byte array represented by the first argument:
• bytesWidth(byte[],int,int)

Note: The default platform character encoding system may be determined by evaluating the expression new InputStreamReader(System.in).getEncoding().

5.1.1.2.1.1.1.11 Modifications to and Constraints on java.awt.Graphics class

The following deprecated method in the java.awt.Graphics class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:
• getClipRect()

The following method in the java.awt.Graphics class shall be present in a procedural application environment; however, its semantics are not required to be fully implemented by a procedural application environment. Furthermore, an application entity shall not rely on the presence of support for the full semantics of this method:
• setXORMode(Color)
If a procedural application environment cannot fulfill the semantics of this method and this method is invoked, then a `java.lang.UnsupportedOperationException` should be raised, and, if the exception is not caught by the application, the application shall be aborted.

The following method shall employ the default platform character encoding system when interpreting the byte array represented by the first argument:

- `drawBytes(byte[],int,int,int,int)`

### 5.1.1.2.1.1.12 Modifications to `java.awt.GridBagLayout` class

The following protected fields in the `java.awt.GridBagLayout` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these fields:

- `comptable`
- `defaultConstraints`
- `layoutInfo`
- `MAXGRIDSIZE`
- `MINSIZE`
- `PREFERREDSIZE`

The following protected methods in the `java.awt.GridBagLayout` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `AdjustForGravity(GridBagConstraints,Rectangle)`
- `ArrangeGrid(Container)`
- `GetLayoutInfo(Container,int)`
- `GetMinSize(Container,GridBagLayoutInfo)`

### 5.1.1.2.1.1.13 Constraints on `java.awt.Image` class

The `java.awt.Image.getProperty(String)` method provides a mechanism for querying a variety of image specific or image category specific properties. The following subsections describe a set of predefined properties, including their values and semantics. An implementation may make use of additional, non-standard properties provided the non-standard property name is prefixed with a reversed domain name or with "x-".

#### 5.1.1.2.1.1.13.1 comment image property

The "comment" property may be used to provide a description of an image, its author, or source. If a value other than `Image.UndefinedProperty` or `null` is returned, it shall be an instance of `java.lang.String`. No other constraints are placed on the value.

#### 5.1.1.2.1.1.13.2 croprect image property

The "croprect" property may be used to indicate what crop rectangle has been applied to the original image.

Note: See Section 5.1.1.2.1.1.13.2 for additional information on this property.

#### 5.1.1.2.1.1.13.3 filters image property

The "filters" property may be used to provide a description of a set of image filters which are applied to an image.
Note: See Section 5.1.2.1.1.1.3.4 for additional information on this property.

5.1.2.1.1.1.13.4 **rescale image property**

The "rescale" property may be used to indicate what scaling transformations have been applied to the original image.

Note: See Section 5.1.2.1.1.1.3.6 for additional information on this property.

5.1.2.1.1.1.14 **Modifications to java.awt.Insets class**

The java.awt.Insets class should override the method java.lang.Object.hashCode() in order to conform to semantic interdependencies with java.lang.Object.equals(Object).

5.1.2.1.1.1.15 **Modifications to java.awt.Polygon class**

The following deprecated methods in the java.awt.Polygon class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- getBoundingBox()
- inside(int,int)

5.1.2.1.1.1.16 **Modifications to java.awt.Rectangle class**

The following deprecated methods in the java.awt.Rectangle class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- inside(int,int)
- move(int,int)
- reshape(int,int,int,int)
- resize(int,int)

5.1.2.1.1.1.17 **Modifications to and Constraints on java.awt.Toolkit class**

The following methods in the java.awt.Toolkit class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- createButton(Button)
- createCanvas(Canvas)
- createCheckbox(Checkbox)
- createCheckboxMenuItem(CheckboxMenuItem)
- createChoice(Choice)
- createComponent(Component)
- createDialog(Dialog)
- createFileDialog(FileDialog)
- createFrame(Frame)
- createLabel(Label)
- createList(List)
- createMenu(Menu)
- createMenuBar(MenuBar)
- createMenuItem(MenuItem)
- createPanel(Panel)
- createPopupMenu(PopupMenu)
• createScrollbar(Scrollbar)
• createScrollPane(ScrollPane)
• createTextArea(TextArea)
• createTextField(TextField)
• createWindow(Window)
• getFontPeer(String,int)
• getMenuShortcutKeyMask()
• getNativeContainer(Component)
• getPrintJob(Frame,String,Properties)
• getScreenResolution()
• getSystemClipboard()
• getSystemEventQueue()
• getSystemEventQueueImpl()
• loadSystemColors(int[])

Note: The above excluded functionality is satisfied by HAVi UI functionality or is not required for application interoperability. See Section 5.1.1.2.4.

The value returned by the java.awt.Toolkit.getScreenSize() method shall be equivalent to the pixel resolution of the current configuration of the default screen device returned by the org.havi.ui.HScreen.getDefaultGraphicsDevice() method.

The first argument to the java.awt.Toolkit.createImage(byte[]) and createImage(byte[],int,int) methods shall be a byte array containing the contents of an application resource which conforms to one of the following content types as constrained by [DASE], Sections 6.2 and 6.3:

• image/jpeg
• image/png
• video/mng

Due to the lack of content type information provided to these two methods, an implementation shall determine the content type by employing implementation dependent heuristics. A procedural application environment may optionally support the heuristic detection and decoding of content types other than those specified above; however, an application shall not rely upon support for the detection or decoding of any other image content types.

Note: If an image format error is detected when parsing the image data associated with an instance of java.awt.Image created by one of the createImage(…) methods, then the error is reported through an applicable ImageObserver.

Note: See [PJAE], Section 5.2, for more information on methods createImage(String) and createImage(URL), which are adopted from [JDK1.2.2]. Note that the text in [PJAE] is not clear that these methods are to be implemented by the java.awt.Toolkit class.

The java.awt.Toolkit.getProperty(String) method provides a mechanism for querying a variety of toolkit properties. No predefined properties are defined by this specification. An implementation may make use of additional, non-standard properties provided the non-standard property name is prefixed with a reversed domain name or with “x-“.

A procedural application environment is not required to support any specific toolkit property; furthermore, an application entity shall not rely on the presence of support for any specific toolkit property.
5.1.1.2.1.1.2 Modifications to `java.awt.event` package

5.1.1.2.1.1.2.1 Modifications to `java.awt.event.KeyEvent` class

The following deprecated constructor in the `java.awt.event.KeyEvent` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this constructor:

- `KeyEvent(Component,int,long,int,int)`

The method `java.awt.event.KeyEvent.isAction()` shall return true for the following key codes:

- `VK_F1` through `VK_F12`
- `VK_LEFT`, `VK_RIGHT`, `VK_UP`, `VK_DOWN`, `VK_HOME`, `VK_END`
- `VK_PAGE_UP`, `VK_PAGE_DOWN`
- `VK_PRINTSCREEN`, `VK_PAUSE`
- `VK_INSERT`
- `VK_SCROLL_LOCK`, `VK_CAPS_LOCK`, `VK_NUM_LOCK`

5.1.1.2.1.1.2.2 Modifications to `java.awt.event.WindowEvent` class

The following constructor in the `java.awt.event.WindowEvent` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this constructor:

- `WindowEvent(Window,int)`

The following method in the `java.awt.event.WindowEvent` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `getWindow()`

5.1.1.2.1.1.3 Modifications to and Constraints on `java.awt.image` package

5.1.1.2.1.1.3.1 Modifications to `java.awt.image.ColorModel` class

The method `java.awt.image.ColorModel.finalize()` need not be overridden by an implementation of a procedural application environment.

5.1.1.2.1.1.3.2 Constraints on `java.awt.image.CropImageFilter` class

The method `setProperties(Hashtable)` shall add a property with the name "croprect" and a value that is an instance of `java.awt.Rectangle` initialized to the crop rectangle.

5.1.1.2.1.1.3.3 Modifications to `java.awt.image.DirectColorModel` class

The method `java.awt.image.DirectColorModel.getRGB()` need not be overridden by an implementation of a procedural application environment if it is implemented generically in a base class in such a manner as to respect the indicated semantics.

5.1.1.2.1.1.3.4 Constraints on `java.awt.image.ImageFilter` class

The following methods of the `java.awt.image.ImageFilter` class and its direct and indirect subclasses are intended to be used only by the image producer of the image being filtered. An application should not invoke any of these methods directly except in the limited case that the application implements a subclass of an existing image filter.
• `getFilterInstance(ImageConsumer)`
• `imageComplete(int)`
• `setColorModel(ColorModel)`
• `setDimensions(int,int)`
• `setHints(int)`
• `setPixels(int,int,int,int,ColorModel,byte[],int,int)`
• `setPixels(int,int,int,int,ColorModel,int[],int,int)`
• `setProperties(Hashtable)`

The method `setProperties(Hashtable)` shall add a property with the name "filters" and a value that is an instance of `java.awt.String` which adheres to the following syntax:

```
[ previous-value " ",  ] filter
```

where `previous-value` is the previous value of the "filters" property, if non-null, and where `filter` is the result of invoking `java.lang.Object.toString()` on the current filter.

5.1.1.2.1.1.3.5 Modifications to `java.awt.image.PixelGrabber` class

The following deprecated method in the `java.awt.image.PixelGrabber` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

• `status()`

5.1.1.2.1.1.3.6 Constraints on `java.awt.image.ReplicateScaleFilter` class

The method `setProperties(Hashtable)` shall add a property with the name "rescale" and a value that is an instance of `java.awt.String` which adheres to the following syntax:

```
width "x" height [ ", " previous-value ]
```

where `width` and `height` are the new scaled width and height, and where `previous-value` is the previous value of the "rescale" property, if non-null.

5.1.1.2.1.1.4 Modifications to `java.beans` package

The following types in the `java.beans` package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these types:

• `BeanDescriptor`
• `BeanInfo`
• `Customizer`
• `EventSetDescriptor`
• `FeatureDescriptor`
• `IndexedPropertyDescriptor`
• `IntrospectionException`
• `Introspector`
• `MethodDescriptor`
• `ParameterDescriptor`
• `PropertyDescriptor`
• `PropertyEditor`
• `PropertyEditorManager`
• `PropertyEditorSupport`
• `SimpleBeanInfo`
Note: The above functionality is excluded on the basis that it is intended solely for design-time support of beans, which is not required by DASE applications.

5.1.1.2.1.1.4.1 Modifications to and Constraints on `java.beans.Beans` class

The following methods in the `java.beans.Beans` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `getInstanceOf(Object, Class)`
- `isInstanceOf(Object, Class)`
- `setDesignTime(boolean)`
- `setGuiAvailable(boolean)`

The following method in the `java.beans.Beans` class shall not instantiate a bean which is a subclass of `java.applet.Applet`:

- `instantiate(ClassLoader, String)`

The method `java.beans.Beans.isDesignTime()` shall always return `false`.

The method `java.beans.Beans.isGuiAvailable()` shall always return `true`.

5.1.1.2.1.1.5 Modifications to and Constraints on `java.io` package

The following deprecated classes in the `java.io` package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these classes:

- `LineNumberInputStream`
- `StringBufferInputStream`

5.1.1.2.1.1.5.1 Constraints on `java.io.BufferedInputStream` class

When the `java.io.BufferedInputStream` class is constructed using the constructor `BufferedInputStream(InputStream)`, the size of the input buffer shall be implementation dependent.

5.1.1.2.1.1.5.2 Modifications to `java.io.ByteArrayOutputStream` class

The following deprecated method in the `java.io.ByteArrayOutputStream` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `toString(int)`

5.1.1.2.1.1.5.3 Modifications to `java.io.DataInput` interface

The deserialization semantics of the `java.io.DataInput` interface shall adhere to those specified by [JDK1.2.2].

The following method in the `java.io.DataInput` interface is not required in any class implementing this interface in a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `readLine()`

5.1.1.2.1.1.5.4 Modifications to `java.io.DataInputStream` class

The following deprecated method in the `java.io.DataInputStream` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:
• `readLine()`

5.1.1.2.1.1.5.5 Modifications to `java.io.DataOutput` interface

The serialization semantics of the `java.io.DataOutput` interface shall adhere to those specified by [JDK1.2.2].

5.1.1.2.1.1.5.6 Modifications to `java.io.File` class

The method `lastModified()` shall return a value which represents the number of milliseconds from 00:00:00 GMT, January 1, 1970.

5.1.1.2.1.1.5.7 Constraints on `java.io.FileInputStream` class

A procedural application environment shall support the fine-grained access control semantics specified by [JDK1.2.2] for the `java.io.FileInputStream` class.

5.1.1.2.1.1.5.8 Constraints on `java.io.FileOutputStream` class

A procedural application environment shall support the fine-grained access control semantics specified by [JDK1.2.2] for the `java.io.FileOutputStream` class.

5.1.1.2.1.1.5.9 Modifications to and Constraints on `java.io.ObjectInputStream` class

The following method in the `java.io.ObjectInputStream` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

• `readLine()`

An application entity shall not rely on interoperability of serialized objects between distinct implementations of a procedural application environment; nevertheless, a procedural application environment shall support local serialization and deserialization.

The external, serialized format of an object is not defined by this specification.

*Note:* Support for implementation independent exchange of serialized objects is not required due to lack of specificity of the external, serialized object format such that two independent implementations would be able to serialize and deserialize in an interoperable manner.

*Note:* Even without an interoperable interchange format for serialized objects, an application entity may nevertheless serialize and deserialize objects within a specific procedural application environment implementation provided it supports the semantics of the above types. For example, an application may serialize an object to a persistent file on a receiver's local file storage system, then deserialize that object at a later time.

A procedural application environment shall support the fine-grained access control semantics specified by [JDK1.2.2] for the `java.io.ObjectInputStream` class.

*Note:* The `ObjectInputStream(InputStream)` constructor and the `enableResolveObject(boolean)` method check for permission using the `SerializablePermission` class and its `enableSubclassImplementation` and `enableSubstitution` targets, respectively.

5.1.1.2.1.1.5.10 Constraints on `java.io.ObjectOutputStream` class

A procedural application environment shall support the fine-grained access control semantics specified by [JDK1.2.2] for the `java.io.ObjectOutputStream` class.

*Note:* The `ObjectOutputStream(OutputStream)` constructor and the `enableReplaceObject(boolean)` method check for permission using the `SerializablePermission` class and its `enableSubclassImplementation` and `enableSubstitution` targets, respectively.
5.1.1.2.1.1.5.11 Clarifications to java.io.PipedInputStream class

The following fields of the java.io.PipedInputStream class shall adhere to the semantics specified in [JDK1.2.2]:

- `in`
- `out`
- `PIPE_SIZE`

5.1.1.2.1.1.5.12 Modifications to java.io.PrintStream class

The following deprecated constructors in the java.io.PrintStream class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these constructors:

- `PrintStream(OutputStream)`
- `PrintStream(OutputStream,boolean)`

5.1.1.2.1.1.5.13 Modifications to java.io.RandomAccessFile class

The following method in the java.io.RandomAccessFile class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `readLine()`

5.1.1.2.1.1.5.14 Modifications to java.io.StreamTokenizer class

The following deprecated constructor in the java.io.StreamTokenizer class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this constructor:

- `StreamTokenizer(InputStream)`

5.1.1.2.1.1.6 Modifications to and Constraints on java.lang package

The following classes in the java.lang package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these classes:

- `Compiler`
- `Process`

5.1.1.2.1.1.6.1 Modifications to java.lang.Character class

The following deprecated methods in the java.lang.Character class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `isJavaLetter(char)`
- `isJavaLetterOrDigit(char)`
- `isSpace(char)`

5.1.1.2.1.1.6.2 Clarifications to java.lang.Class class

The following methods in the java.lang.Class class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `getClasses()`
- `getDeclaredClasses()`
The methods required by `java.lang.Class` class shall adhere to the semantics specified by [JDK1.2.2].

5.1.1.2.1.1.6.3 Modifications to `java.lang.ClassLoader` class

The following deprecated method in the `java.lang.ClassLoader` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `defineClass(byte[],int,int)`

  Note: The [JDK1.2.2] method `defineClass(String,byte[],int,int,java.security.ProtectionDomain)` is to be added to this class as described in [PJAE], Section 5.9.

The method `java.lang.ClassLoader.loadClass(String,boolean)` may be concrete, and not abstract. In the case that an implementation of this class does not implement the semantics of this method, then a default implementation shall be provided which, if invoked, shall cause a `java.lang.ClassNotFoundException` to be raised.

The method `java.lang.ClassLoader.findLoadedClass(String)` shall adhere to the semantics specified by [JDK1.2.2].

5.1.1.2.1.1.6.4 Constraints on `java.lang.Double` class

The following constraints shall apply to the constant fields specified by `java.lang.Double`:

- `MIN_VALUE == longBitsToDouble(0x0000000000000001L)`
- `MAX_VALUE == longBitsToDouble(0x7FEFFFFFFFFFFFFFL)`
- `NaN == longBitsToDouble(0x7FF8000000000000L)`
- `NEGATIVE_INFINITY == longBitsToDouble(0xFFF0000000000000L)`
- `POSITIVE_INFINITY == longBitsToDouble(0x7FF0000000000000L)`

5.1.1.2.1.1.6.5 Constraints on `java.lang.Float` class

The following constraints shall apply to the constant fields specified by `java.lang.Float`:

- `MIN_VALUE == intBitsToFloat(0x00000001)`
- `MAX_VALUE == intBitsToFloat(0x7F7FFFFF)`
- `NaN == intBitsToFloat(0xFF800000)`
- `NEGATIVE_INFINITY == intBitsToFloat(0x7FF00000)`
- `POSITIVE_INFINITY == intBitsToFloat(0x7F800000)`

5.1.1.2.1.1.6.6 Constraints on `java.lang.Math` class

Non-strict floating point rules shall apply to the functions supported by `java.lang.Math`.

5.1.1.2.1.1.6.7 Constraints on `java.lang.Object` class

Unless explicitly defined by a subclass of `java.lang.Object`, the form taken by the return value of the method `java.lang.Object.toString()` is implementation dependent.

5.1.1.2.1.1.6.8 Modifications to `java.lang.Runtime` class

The following deprecated methods in the `java.lang.Runtime` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `getLocalizedInputStream(InputStream)`
- `getLocalizedOutputStream(OutputStream)`
The following methods in the `java.lang.Runtime` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `runFinalizersOnExit(boolean)`
- `traceInstructions()`
- `traceMethodCalls()`

The following methods in the `java.lang.Runtime` class are not required to be implemented by a procedural application environment; if they are implemented, then they shall cause a `SecurityException` to be raised if invoked by an application:

- `exec(String)`
- `exec(String, String[])`  
- `exec(String[])`  
- `exec(String[], String[])`  
- `exit(int)`  
- `load(String)`  
- `loadLibrary(String)`

5.1.1.2.1.1.6.9 Modifications to `java.lang.SecurityManager` class

The following deprecated methods in the `java.lang.SecurityManager` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `classDepth(String)`
- `classLoaderDepth()`
- `currentClassLoader()`
- `currentLoadedClass()`
- `getInCheck()`
- `inClass(String)`
- `inClassLoader()`

The following deprecated field in the `java.lang.SecurityManager` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this field:

- `inCheck`

5.1.1.2.1.1.6.10 Modifications to `java.lang.String` class

The following deprecated constructors in the `java.lang.String` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these constructors:

- `String(byte[], int)`
- `String(byte[], int, int, int)`

The following constructor shall employ the default platform character encoding system when interpreting the byte array represented by the first argument:

- `String(byte[], int)`

The following deprecated method in the `java.lang.String` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `getBytes(int, int, byte[], int)`
A procedural application environment shall support the character encodings specified by Annex E.1 for those methods of the `java.lang.String` class which use a parameter that specifies a character encoding name.

### 5.1.1.2.1.1.6.11 Modifications to `java.lang.System` class

The following deprecated method in the `java.lang.System` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `getenv(String)`

The following field in the `java.lang.System` class shall be implemented by a procedural application environment; however, an application entity shall not reference this field:

- `in`  
  
  *Note:* This field is solely provided for use by the implementation of a procedural application environment or other components of a DASE System implementation.

The following fields in the `java.lang.System` class shall be implemented by a procedural application environment. Any output produced as a side effect of writing to the `PrintStream` values of these fields shall not affect the system display; however, a procedural application environment may provide an implementation defined means for displaying such output.

- `err`  
- `out`

The following method in the `java.lang.System` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `runFinalizersOnExit(boolean)`

The following methods in the `java.lang.System` class are not required to be implemented by a procedural application environment; if they are implemented, then they shall cause a `SecurityException` to be raised if invoked by an application:

- `exit(int)`  
- `load(String)`  
- `loadLibrary(String)`  
- `setIn(InputStream)`  
- `setErr(PrintStream)`  
- `setOut(PrintStream)`

### 5.1.1.2.1.1.6.12 Modifications to `java.lang.Thread` class

The following methods in the `java.lang.Thread` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `countStackFrames()`  
- `destroy()`  
- `resume()`  
- `stop()`  
- `stop(Throwables)`  
- `suspend()`
5.1.1.2.1.1.6.13 Modifications to java.lang.ThreadGroup class

The following methods in the java.lang.ThreadGroup class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- allowThreadSuspension(boolean)
- list()
- resume()
- stop()
- suspend()

5.1.1.2.1.1.6.14 Addition of java.lang.UnsupportedOperationException class

The java.lang.UnsupportedOperationException class defined by [JDK1.2.2] shall be implemented by a procedural application environment.

5.1.1.2.1.1.7 Modifications to java.net package

The following types in the java.net package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these types:

- ConnectException
- ContentHandler
- ContentHandlerFactory
- DatagramSocketImpl
- FileNameMap
- HttpURLConnection
- NoRouteToHostException
- ServerSocket
- Socket
- SocketImpl
- SocketImplFactory
- UnknownServiceException
- URLConnection
- URLStreamHandler
- URLStreamHandlerFactory

Note: The above functionality is excluded on the basis that DASE-1 does not require support for a return channel, and, consequently, no reliable use may be made of connection oriented network facilities. In contrast, DASE-1 does support unidirectional, connection-less networking facilities through the DatagramSocket and MulticastSocket types.

5.1.1.2.1.1.7.1 Modifications to java.net.MulticastSocket class

The following deprecated methods in the java.net.MulticastSocket class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- getTTL()
- send(DatagramPacket,byte)
- setTTL(byte)
5.1.1.2.1.1.7.2 Modifications to `java.net.URL` class

When constructing an instance of the `java.net.URL` class, a stream protocol handler object need not be constructed.

*Note:* A stream protocol handler is an instance of `java.net.URLStreamHandler`, whose support is not required by this specification.

The following methods in the `java.net.URL` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `getContent()`
- `.openConnection()`
- `openStream()`
- `sameFile(URL)`
- `setURLStreamHandlerFactory(URLStreamHandlerFactory)`

5.1.1.2.1.1.8 Modifications to `java.security` package

5.1.1.2.1.1.8.1 Modifications to `java.security.Key` interface

The following field in the `java.security.Key` interface is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this field:

- `serialVersionUID`

5.1.1.2.1.1.8.2 Modifications to `java.security.Provider` class

The following methods in the `java.security.Provider` class shall adhere to the semantics specified by [JDK1.2.2]:

- `clear()`
- `put(Object, Object)`
- `remove(Object)`

5.1.1.2.1.1.8.3 Modifications to `java.security.PublicKey` interface

The following field in the `java.security.PublicKey` interface is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this field:

- `serialVersionUID`

5.1.1.2.1.1.8.4 Modifications to `java.security.Security` class

The following deprecated method in the `java.security.Security` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

- `getAlgorithmProperty(String, String)`

5.1.1.2.1.1.9 Modifications to `java.text` package

The following types in the `java.text` package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these types:

- `BreakIterator`
5.1.1.2.1.1.10 Modifications to java.util package

5.1.1.2.1.1.10.1 Modifications to and Constraints on java.util.Calendar class

If the argument to the method java.util.Calendar.after(Object) or before(Object) is not an instance of java.util.Calendar, then this method shall return false.

If the java.util.Calendar class or a subclass overrides the method java.lang.Object.equals(Object), then the method java.lang.Object.hashCode() should also be overridden.

5.1.1.2.1.1.10.2 Modifications to java.util.Date class

The following deprecated constructors in the java.util.Date class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these constructors:

- Date(String)
- Date(int,int,int)
- Date(int,int,int,int,int)
- Date(int,int,int,int,int,int)

The Date() constructor should derive time of day from accurate time information available from the application delivery system.

The following deprecated methods in the java.util.Date class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- getDate()
- getDay()
- getHours()
- getMinutes()
- getMonth()
- getSeconds()
- getTimezoneOffset()
- getYear()
- parse(String)
- setDate(int)
- setHours(int)
- setMinutes(int)
- setMonth(int)
- setSeconds(int)
- setYear(int)
- toGMTString()
- toLocaleString()
- UTC(int,int,int,int,int,int)

An implementation of the java.util.Date class should override the method java.lang.Object.clone().
5.1.1.2.1.1.10.3 Modifications to `java.util.Locale` class

A procedural application environment shall support all locales specified in Annex E.2. Any `Locale` typed field of the `Locale` class which is not required by Annex E.2 is not required to have a value other than `null`. Except for the predefined `Locale` fields specified by Annex E.2, an application entity which uses a `Locale` typed field of the `Locale` class shall not rely on its value being any value other than `null`.

The method `java.util.Locale.getDefault()` shall return a clone of the default locale instance, which shall reflect the current value of the Java system properties "user.language" and "user.region".

The method `java.util.Locale.setDefault(Locale)` shall check for permission to write the Java system property "user.language"; if denied, a `java.lang.SecurityException` shall be raised.

Note: In order to obtain information about available locales supported by a procedural application environment, the `org.atsc.util.locales` Xlet context property may be used. See Annex D.3 for further information.

5.1.1.2.1.1.10.4 Modifications to `java.util.Properties` class

The following methods in the `java.util.Properties` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `save(OutputStream,String)`
- `list(PrintStream)`
- `list(PrintWriter)`

If an application entity invokes the method `java.util.Properties.load(InputStream)`, then the content of the referenced input stream shall consist of a sequence of US-ASCII characters encoded as individual octets that adhere to the following `property list resource` syntax:

```
properties:    line*
line:         ( empty | comment | property ) nl
empty:        sp*
comment:      ( "\" | "!" ) pchar*
property:     key sp* value-separator [ sp* value ]
nl:           "\n" | "\r" | "\r\n"
sp:           " " | "\t"
key:          kchar+
value-separator:   "=" | ":"
value:        vchar*
char:         { any ascii character except NUL, LF, CR }
kchar:        char - { '\', '"', ':', ' ', '\t' } | escape
vchar:        char - { '\' } | escape
escape:       "\n" | "\r" | "\r\n" | unicode-escape | ascii-escape
unicode-escape:  "\u" 4*[0-9a-fA-F]
ascii-escape:   "\" { char - { '"', '\', 't', 'u' } }
```

Prior to parsing a line according to the above syntax, any line continuations shall first be appended together to form a whole continued line in accordance with the following syntax. When appending line continuations to form a continued line, the sequence matching the `remove-on-append` syntactic token shall be removed at the boundary between a line and its subsequent continuation.
The content type of a property list resource encoded shall be specified as a plain text content type as described below in Section 5.3.1. When a file or resource name extension is used to identify a property list resource, the extension ".properties" should be used.

If the content of the input stream provided to the java.util.Properties.load(InputStream) method does not adhere to the above syntax, then a procedural application environment may cause an IllegalArgumentException to be raised.

The semantics of the method of java.util.Properties.put(Object, Object), as inherited from java.util.Hashtable, shall be constrained as follows: if the first or the second argument is non-null and the type of the argument is not java.lang.String, then an IllegalArgumentException may be raised.

5.1.1.2.1.10.5 Clarifications to java.util.PropertyResourceBundle class

The constructor PropertyResourceBundle(InputStream) shall employ Properties.load(InputStream) to effect the deserialization of a property resource bundle.

5.1.1.2.1.10.6 Modifications to java.util.ResourceBundle class

A resource bundle should contain a key whose value is "LocaleString" and whose value is a locale identifier adhering to the syntax of the value of java.util.Locale.toString().

Note: The presence of this key permits the user of a resource bundle to determine if the bundle returned by java.util.ResourceBundle.getBundle(...) corresponds to the requested bundle.

5.1.1.2.1.10.7 Constraints on java.util.TimeZone class

The value returned by java.util.TimeZone.getID() and the argument provided to java.util.TimeZone.setID(String) shall adhere to the timezone-id syntax as follows:

timezone-id: tz-custom-id

tz-custom-id: "GMT" sign hours [ [:] minutes ]

sign: + | -

hours: digit | digit digit

minutes: digit digit

digit: \[0-9\]

The method java.util.TimeZone.getDefault() shall return a clone of the default timezone instance, which shall reflect the current value of the Java system property "user.timezone". The method java.util.TimeZone.setDefault(TimeZone) shall check for permission to write the Java system property "user.timezone"; if denied, a java.lang.-SecurityException shall be raised.

5.1.1.2.1.11 Modifications to java.util.zip package

The following class in the java.util.zip package is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this class:

- GZIPInputStream

Note: The GZIP archive content type is not supported by DASE-1.
5.1.1.2.1.11.1 Clarifications to `java.util.zip.CRC32` class

The class `java.util.zip.CRC32` shall implement the checksum algorithm specified in [DASE-ZIP], Annex C.

5.1.1.2.1.11.2 Constraints on `java.util.zip.Inflater` class

The following constructor in the `java.util.zip.Inflater` class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this constructor:

- `Inflater()`

The following methods in the `java.util.zip.Inflater` class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:

- `getAdler()`
- `setDictionary(byte[])`
- `setDictionary(byte[], int, int)`

The class `java.util.zip.Inflater` need not implement support for the ZLIB header or checksum; furthermore, an application entity shall not rely on the presence of support for the ZLIB header. In particular, the following constructor invocation should cause a `java.lang.UnsupportedOperationException` to be raised:

- `new Inflater(false)`

5.1.1.2.1.11.3 Constraints on `java.util.zip.InflaterInputStream` class

An implementation of the `java.util.zip.InflaterInputStream` class should override the methods `available()` and `close()`.

The `java.util.zip.Inflater` instance employed by the `java.util.zip.InflaterInputStream` class need not support the ZLIB header or syntax as specified in Section 5.1.1.2.1.11.2 above.

5.1.1.2.1.2 Non-Required PJAE Features

The following `PJAE required features` are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these features:

- `java.applet` package, [PJAE], Section 5.1
- `audio/au` audio format, [PJAE], Section 5.1
- `java.awt.datatransfer` package, [PJAE], Section 5.3
- `image/gif` image format, [PJAE], Section 5.5
- `image/xbm` image format, [PJAE], Section 5.5
- `java.awt.peer` package, [PJAE], Section 5.6
- `http` protocol, [PJAE], Section 5.12
- `java.text.resources` package, [PJAE], Section 5.24
- `com.sun.awt` package, [PJAE], Section 6.2
- `com.sun.lang` package, [PJAE], Section 6.3
- `com.sun.util` package, [PJAE], Section 6.4
5.1.1.2.1.3 Required PJAE Optional Features

The following PJAE optional features shall be implemented by a procedural application environment:

- java.io user-visible file system group, [PJAE], Section 5.8

5.1.1.2.1.3.1 Definition of java.util.zip.ZipConstants class

The class java.util.zip.ZipConstants is defined as follows:

```java
interface ZipConstants {
    /* Header signatures */
    static long LOCSIG = 0x04034b50L; // "PK\003\004"
    static long EXTSIG = 0x08074b50L; // "PK\007\008"
    static long CENSIG = 0x02014b50L; // "PK\001\002"
    static long ENDSIG = 0x06054b50L; // "PK\005\006"
    /* Header sizes in bytes (including signatures) */
    static final int LOCHDR = 30; // LOC header size
    static final int EXTHDR = 16; // EXT header size
    static final int CENHDR = 46; // CEN header size
    static final int ENDHDR = 22; // END header size
    /* Local file (LOC) header field offsets */
    static final int LOCVER = 4;  // version needed to extract
    static final int LOCFLG = 6;  // general purpose bit flag
    static final int LOCHOW = 8;  // compression method
    static final int LOCTIM = 10; // modification time
    static final int LOC CRC = 14; // uncompressed file crc-32 value
    static final int LOC SIZ = 18; // compressed size
    static final int LOC LEN = 22; // uncompressed size
    static final int LOC NAM = 26; // filename length
    static final int LOCEXT = 28; // extra field length
    /* Extra local (EXT) header field offsets */
    static final int EXTCRC = 4;  // uncompressed file crc-32 value
    static final int EXTSIZ = 8;  // compressed size
    static final int EXTLEN = 12; // uncompressed size
    /* Central directory (CEN) header field offsets */
    static final int CENVEM = 4;  // version made by
    static final int CENVER = 6;  // version needed to extract
    static final int CENFLG = 8;  // encrypt, decrypt flags
    static final int CENHOW = 10; // compression method
    static final int CENTIM = 12; // modification time
    static final int CENCRC = 16; // uncompressed file crc-32 value
    static final int CENSIZ = 20; // compressed size
    static final int CEN LEN = 24; // uncompressed size
    static final int CEN NAM = 28; // filename length
    static final int CENEXT = 30; // extra field length
    static final int CENCOM = 32; // comment length
    static final int CENDSK = 34; // disk number start
    static final int CENATT = 36; // internal file attributes
    static final int CENATX = 38; // external file attributes
    /* End of central directory (END) header field offsets */
    static final int ENDSUB = 8;  // number of entries on this disk
    static final int E NDTOT = 10; // total number of entries
    static final int ENDSIZ = 12; // central directory size in bytes
    static final int ENDOFF = 16; // offset of first CEN header
    static final int ENDCOM = 20; // zip file comment length
}
```

The fields LOCSIG, EXTSIG, CENSIG, and ENDSIG shall be interpreted as if they have an implicit, but unspecified final qualifier; i.e., they shall be interpreted as constants.
5.1.1.2.1.4 Non-Required PJAE Optional Features

The following PJAE optional features are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these features:

- java.math package, [PJAE], Section 5.11
- ssl, gopher, ftp, mailto, file protocols, [PJAE], Section 5.12
- java.rmi package and subpackages, [PJAE], Section 5.13 through 5.16
- java.security code-signing group, [PJAE], Section 5.17
- java.security.cert code-signing group, [PJAE], Section 5.19
- java.security.interfaces package, [PJAE], Section 5.20
- java.security.spec package, [PJAE], Section 5.21
- java.sql package, [PJAE], Section 5.22
- java.util code-signing group, [PJAE], Section 5.25
- java.util.jar package, [PJAE], Section 5.26

The following PJAE optional classes in the java.util.zip package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these classes:

- Adler32
- Deflater
- DeflaterOutputStream
- GZIPOutputStream
- ZipOutputStream

Note: These classes are not required to be supported even though [PJAE], Section 5.27, Note 2 indicates that they are required when ZipFile is supported.

5.1.1.2.1.5 Default Cryptographic Service Provider

A procedural application environment is not required to provide a default cryptographic service provider that implements the java.security.Provider abstract class.

5.1.1.2.2 Java Media Framework (JMF) Interfaces

An application entity which adheres to this content type may use and a procedural application environment shall support the use of Java Media Framework, Version 1.0, APIs in a manner consistent with [JMF] as extended and restricted below.

A procedural application environment shall use the values of constants defined in ANNEX B in the case that a JMF defined constant field does not specify a value.

Note: See Annexes A.14 and A.15 for all required JMF types.

5.1.1.2.2.1 Clarifications

5.1.1.2.2.1.1 Clarifications to javax.media.MediaLocator class

If the external form of an instance of MediaLocator takes the form of a URI, then the method getProtocol() shall return the scheme as defined by [URI]; otherwise, the returned value shall be implementation defined.
If the external form of an instance of `MediaLocator` takes the form of a URI, then the method `getRemainder()` shall return the `scheme-specific-part` as defined by [URI]; otherwise, the returned value shall be implementation defined.

The external form of an instance of `MediaLocator` shall be consistent with the external form of an instance of `javax.tv.media.Locator`, and, in particular, shall satisfy the constraint specified by Section 5.1.1.2.3.1.3.

5.1.1.2.2.1.1 Clarifications to `javax.media.protocol.DataSource` class

The method `javax.media.protocol.DataSource.setLocator(MediaLocator)` shall cause an error to be raised in the case that a previous media locator was established.

5.1.1.2.2.2 Constraints

5.1.1.2.2.2.1 Constraints on `javax.media.Clock` interface

The following constraints shall apply to the constant fields specified by `javax.media.Clock`:

- `RESET == new Time ( java.lang.Long.MAX_VALUE )`

5.1.1.2.2.2.2 Constraints on `javax.media.Control` interface

A class which implements `Control` need not implement a user interface component. If a user interface component is not provided for a `Control`, then `getControlComponent()` shall return `null`.

5.1.1.2.2.2.3 Constraints on `javax.media.Controller` interface

The following constraints shall apply to the constant fields specified by `javax.media.-Controller`:

- `LATENCY_UNKNOWN == new Time ( java.lang.Long.MAX_VALUE )`

5.1.1.2.2.2.4 Constraints on `javax.media.Duration` interface

The following constraints shall apply to the constant fields specified by `javax.media.-Duration`:

- `DURATION_UNBOUNDED == new Time ( java.lang.Long.MAX_VALUE )`
- `DURATION_UNKNOWN == new Time ( java.lang.Long.MAX_VALUE - 1 )`

5.1.1.2.2.2.5 Constraints on `javax.media.ControllerListener` interface

A class which implements `ControllerListener` shall implement `java.util.-EventListener`.

5.1.1.2.2.2.6 Constraints on `javax.media.GainChangeListener` interface

A class which implements `GainChangeListener` shall implement `java.util.-EventListener`.

5.1.1.2.2.2.7 Constraints on `javax.media.Manager` class

If the external form of a `MediaLocator` which would be used to construct a `DataSource` takes a form which may map to multiple access methods (protocols) or which, by itself, does not designate an access method, then the implementation of `Manager` shall determine a specific
access method (protocol) to be used in order to construct the class name to be used to instantiate a DataSource.

The following constraints shall apply to the constant fields specified by javax.media.Manager:

- UNKNOWN_CONTENT_NAME == ContentDescriptor.CONTENT_UNKNOWN

The first entry in the java.util.Vector instance returned from javax.media.Manager.getDataSourceList(String) shall adhere to the following syntax:

```
media.protocol.protocol-name.DataSource
```

where the value of protocol-name corresponds to the argument to getDataSourceList(String).

The second and subsequent entries in the java.util.Vector instance returned from javax.media.Manager.getHandlerClassList(String) shall adhere to the following syntax:

```
content-prefix.media.content.content-name.Handler
```

where the value of content-prefix corresponds to an entry of the value returned by javax.media.PackageManager.getContentPrefixList() and the value of content-name corresponds to the result of applying javax.media.protocol.ContentDescriptor.mimeTypeToPackageName(String) to the argument to getHandlerClassList(String).

5.1.1.2.2.2.8 Constraints on javax.media.MediaEvent interface

A class which implements MediaEvent shall be a subtype of the java.util.EventObject class.

5.1.1.2.2.2.9 Constraints on javax.media.MediaHandler interface

When the method MediaHandler.setSource(DataSource) is invoked on an instance of a built-in Player, an IncompatibleSourceException shall be raised.

5.1.1.2.2.2.10 Constraints on javax.media.PackageManager class

A runtime exception shall be raised upon any invocation of either of the following methods of the PackageManager class by an application entity:

- commitContentPrefixList()
- commitProtocolPrefixList()

5.1.1.2.2.2.11 Constraints on javax.media.Player interface

A class which implements Player need not implement a visual component. If a visual component is not provided for a Player, then getVisualComponent() shall return null.

If a Player does provide a visual component, then the component shall support the semantics of java.awt.Component with respect to positioning and scaling.

*Note:* A Player that supports only background video presentation, as opposed to component based video presentation, would not provide a visual component.

5.1.1.2.2.2.12 Constraints on javax.media.protocol.ContentDescriptor class

The value returned by the method getContentType() and the argument supplied to the constructor ContentDescriptor(String) and the method mimeTypeToPackageName(String) shall adhere to the content-type syntax specified by [DASE], Section 5.1.2.3. If one or more optional content type parameters are present in the argument to mimeTypeToPackag-
Name(String), then they shall be ignored for the purpose of computing a corresponding package name.

The value of ContentDescriptor.CONTENT_UNKNOWN shall be "application/octet-stream".

5.1.1.2.2.13 Constraints on javax.media.protocol.DataSource class

The value returned by the method getContentType() shall adhere to the content-type syntax specified by [DASE], Section 5.1.2.3.

5.1.1.2.2.3 Modifications

5.1.1.2.2.3.1 Modification to javax.media.ControllerEvent class

The class javax.media.ControllerEvent shall be a subtype of the java.util.EventObject class.

5.1.1.2.2.3.2 Modification to javax.media.GainChangeEvent class

The class javax.media.GainChangeEvent shall be a subtype of the java.util.EventObject class.

5.1.1.2.2.3.3 Modifications to javax.media.protocol package

The following class in the java.media.protocol package is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this class:

• URLDataSource

5.1.1.2.2.3.3.1 Modifications to javax.media.protocol.DataSource class

The following method in the javax.media.protocol.DataSource class is not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for this method:

• initCheck()

5.1.1.2.2.3.4 Modifications to javax.media.protocol.ContentDescriptor class

The method ContentDescriptor.mimeTypeToPackageName(String) shall be defined and accessible as a public static method.

5.1.1.2.2.4 Extensions

5.1.1.2.2.4.1 Built-In Data Sources

A procedural application environment shall implement the following built-in data sources:

• asynchronous data piping data source
• asynchronous data piping, raw packet data source
• asynchronous download, non-flow controlled data source
• asynchronous digital television closed captioning data source
5.1.1.2.2.4.1.1 Asynchronous Data Piping Data Source

A procedural application environment shall implement a built-in data source as follows:

Table 2 Asynchronous Data Piping Data Source Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>protocol</td>
<td>&quot;atsc.async.piping&quot;</td>
<td></td>
</tr>
<tr>
<td>controls</td>
<td>none required</td>
<td></td>
</tr>
<tr>
<td>seekable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>rate configurable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>type</td>
<td>push only</td>
<td></td>
</tr>
<tr>
<td>source stream</td>
<td>single</td>
<td>1</td>
</tr>
<tr>
<td>stream content type</td>
<td>not required</td>
<td>2</td>
</tr>
<tr>
<td>stream content length</td>
<td>not required</td>
<td>3</td>
</tr>
<tr>
<td>stream controls</td>
<td>none required</td>
<td></td>
</tr>
<tr>
<td>stream positionable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>stream format</td>
<td>decapsulated data</td>
<td>4</td>
</tr>
<tr>
<td>minimum transfer size</td>
<td>( \geq 1 )</td>
<td>5</td>
</tr>
</tbody>
</table>

Notes

2. If content type of stream is not sniffed or not determined through out-of-band metadata, then `SourceStream.getContentDescriptor()` shall return a value equivalent to `new ContentDescriptor(ContentDescriptor.CONTENT_UNKNOWN)`.
3. If content length cannot be determined by out-of-band metadata, then `SourceStream.getContentLength()` shall return `SourceStream.LENGTH_UNKNOWN`.
4. Decapsulation of data piping shall extract and return payload from transport packets. If a packet is duplicated, then its data shall not be returned. If the continuity counter is discontinuous or an error indicator is present, then `javax.tv.media.protocol.DataLostException` shall be raised upon the next invocation of `javax.tv.media.protocol.PushSourceStream2.readStream` which would cause the lost data to be read.
5. Minimum transfer size may be as few as one byte per read operation. Read operations shall return the remainder of buffered data upon each read up to the requested transfer size. If data arrives more quickly than read operations occur, buffer overflow may occur in which case a `DataLostException` shall be raised upon the next read operation.

5.1.1.2.2.4.1.2 Asynchronous Data Piping, Raw Packet Data Source

A procedural application environment shall implement a built-in data source as follows:

Table 3 Asynchronous Data Piping, Raw Packet Data Source Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>protocol</td>
<td>&quot;atsc.async.piping.raw&quot;</td>
<td></td>
</tr>
<tr>
<td>controls</td>
<td>none required</td>
<td></td>
</tr>
<tr>
<td>seekable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>rate configurable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>type</td>
<td>push only</td>
<td></td>
</tr>
<tr>
<td>source stream</td>
<td>single</td>
<td>1</td>
</tr>
<tr>
<td>stream content type</td>
<td>not required</td>
<td>2</td>
</tr>
<tr>
<td>stream content length</td>
<td>not required</td>
<td>3</td>
</tr>
<tr>
<td>stream controls</td>
<td>none required</td>
<td></td>
</tr>
<tr>
<td>stream positionable</td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>
Stream format | raw transport stream packets | 4
---|---|---
minimum transfer size | 188 | 5

Notes
2. If content type of stream is not sniffed or not determined through out-of-band metadata, then `SourceStream.getContentDescriptor()` shall return a value equivalent to `new ContentDescriptor(ContentDescriptor.CONTENT_UNKNOWN)`.
3. If content length cannot be determined by out-of-band metadata, then `SourceStream.getContentLength()` shall return `SourceStream.LENGTH_UNKNOWN`.
4. Each transport stream packet associated with the stream shall be returned without modification and in its entirety. Each read from stream shall return exactly zero or one packet.
5. If fewer than 188 bytes are requested in a read, then zero bytes shall be returned irrespective of whether one or more packets are buffered for reading. If greater than this number of bytes are requested and this number is a non-zero integral multiple of 188, then either zero bytes or some integral multiple of 188 bytes shall be returned depending upon how many packets have been buffered for reading.

5.1.1.2.4.1.3 Asynchronous Download, Non-Flow Controlled Data Source

A procedural application environment shall implement a built-in data source as follows:

Table 4 Asynchronous Download, Non-Flow Controlled Data Source Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>protocol</td>
<td>&quot;atsc.async.download&quot;</td>
<td></td>
</tr>
<tr>
<td>controls</td>
<td>none required</td>
<td></td>
</tr>
<tr>
<td>seekable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>rate configurable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>type</td>
<td>push only</td>
<td>1</td>
</tr>
<tr>
<td>source stream</td>
<td>single</td>
<td></td>
</tr>
<tr>
<td>stream content type</td>
<td>not required</td>
<td>2</td>
</tr>
<tr>
<td>stream content length</td>
<td>not required</td>
<td>3</td>
</tr>
<tr>
<td>stream controls</td>
<td>none required</td>
<td></td>
</tr>
<tr>
<td>stream positionable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>stream format</td>
<td>decapsulated data</td>
<td>4</td>
</tr>
<tr>
<td>minimum transfer size</td>
<td>≥ 1</td>
<td>5</td>
</tr>
</tbody>
</table>

Notes
2. If content type of stream is not sniffed or not determined through out-of-band metadata, then `SourceStream.getContentDescriptor()` shall return a value equivalent to `new ContentDescriptor(ContentDescriptor.CONTENT_UNKNOWN)`.
3. If content length cannot be determined by out-of-band metadata, then `SourceStream.getContentLength()` shall return `SourceStream.LENGTH_UNKNOWN`.
4. Decapsulation of non-flow controlled U-N download shall extract and return payload from DSMCC sections. If data is discontinuous or an error indicator is present, then `javax.tv.media.protocol.DataLostException` shall be raised upon the next invocation of `javax.tv.media.protocol.PushSourceStream2.readStream` which would cause the lost data to be read.
5. Minimum transfer size may be as few as one byte per read operation. Read operations shall return the remainder of buffered data upon each read up to the requested transfer size. If data arrives more quickly than read operations occur, buffer overflow may occur in which case a `DataLostException` shall be raised upon the next read operation.
Note: The use of an asynchronous download, non-flow controlled data source is explicitly restricted for use with asynchronous streaming data and not for use for non-streaming data (e.g., carousel data).

5.1.1.2.2.4.1.4 Asynchronous Digital Television Closed Captioning Data Source

A procedural application environment shall implement a built-in data source as follows:

Table 5 Asynchronous Digital Television Closed Captioning Data Source Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>protocol</td>
<td>&quot;atsc.async.dtvcc&quot;</td>
<td></td>
</tr>
<tr>
<td>controls</td>
<td>none required</td>
<td></td>
</tr>
<tr>
<td>seekable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>rate configurable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>type</td>
<td>push only</td>
<td>1</td>
</tr>
<tr>
<td>source stream</td>
<td>single</td>
<td></td>
</tr>
<tr>
<td>stream content type</td>
<td>application/octet-stream</td>
<td></td>
</tr>
<tr>
<td>stream content length</td>
<td>LENGTH_UNKNOWN</td>
<td>2</td>
</tr>
<tr>
<td>stream controls</td>
<td>none required</td>
<td></td>
</tr>
<tr>
<td>stream positionable</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>stream format</td>
<td>decapsulated data</td>
<td>3</td>
</tr>
<tr>
<td>minimum transfer size</td>
<td>104</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes:
2. SourceStream.getContentLength() shall return SourceStream.LENGTH_UNKNOWN.
3. See Section 5.1.1.2.2.4.1.4.1, DTVCC Stream Format.

Note: Access to closed captioning data provided by this mechanism is expressly not intended to satisfy any regulatory requirements regarding the processing of closed captioning data on a digital television receiver or any other terminal device.

5.1.1.2.2.4.1.4.1 DTVCC Stream Format

Each transfer operation performed upon an atsc.async.dtvcc data source shall take the form of a data frame which adheres to Table 6 DTVCC Frame Format.

Table 6 DTVCC Frame Format

<table>
<thead>
<tr>
<th>Syntax</th>
<th>Number of bits</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>dtvcc_frame()</td>
<td></td>
<td></td>
</tr>
<tr>
<td>stc_valid</td>
<td>1</td>
<td>bslbf</td>
</tr>
<tr>
<td>pts_valid</td>
<td>1</td>
<td>bslbf</td>
</tr>
<tr>
<td>stc_high</td>
<td>1</td>
<td>uimsbf</td>
</tr>
<tr>
<td>pts_high</td>
<td>1</td>
<td>uimsbf</td>
</tr>
<tr>
<td>reserved</td>
<td>4</td>
<td>bslbf</td>
</tr>
<tr>
<td>stc_low</td>
<td>32</td>
<td>uimsbf</td>
</tr>
<tr>
<td>pts_low</td>
<td>32</td>
<td>uimsbf</td>
</tr>
<tr>
<td>reserved</td>
<td>1</td>
<td>bslbf</td>
</tr>
<tr>
<td>process_cc_data_flag</td>
<td>1</td>
<td>bslbf</td>
</tr>
<tr>
<td>reserved</td>
<td>1</td>
<td>bslbf</td>
</tr>
<tr>
<td>cc_count</td>
<td>5</td>
<td>uimsbf</td>
</tr>
<tr>
<td>reserved</td>
<td>8</td>
<td>bslbf</td>
</tr>
<tr>
<td>for ( i=0; i &lt; cc_count; i++ ) {</td>
<td></td>
<td></td>
</tr>
<tr>
<td>marker_bits</td>
<td>5</td>
<td>'111111'</td>
</tr>
<tr>
<td>cc_valid</td>
<td>1</td>
<td>bslbf</td>
</tr>
<tr>
<td>cc_type</td>
<td>2</td>
<td>bslbf</td>
</tr>
<tr>
<td>cc_data_1</td>
<td>8</td>
<td>bslbf</td>
</tr>
</tbody>
</table>
Note: A dtvcc_frame() consists of 11 to 104 octets of data, depending upon the value of cc_count.

A dtvcc_frame() shall be constructed from picture user data contained in the active video elementary stream of the data source specified by the media locator which was used to instantiate this data source. If no video elementary stream is present in the active video elementary stream or no picture user data is contained therein, then no dtvcc_frame() shall be constructed. Only that picture user data whose user_data_type_code is the value 0x03 shall be used to construct a dtvcc_frame().

Note: In order to specify a media locator to construct this data source, use the ?dtvcc query component syntax with a "tv:" URI. See [DASE], Section 5.1.2.3.1.4, Television Scheme, for further information.

The fields stc_valid, stc_high, and stc_low shall be determined as follows: if the 27MHz system time clock (STC) is valid at the time the dtvcc_frame() is constructed, then stc_valid shall be set to '1' and the 33 most significant bits of the 42-bit STC shall be extracted and placed into stc_high (STC[41:41]) and stc_low (STC[40:9]); otherwise, stc_valid shall be set to '0'.

Note: The 33 most significant bits of the 42-bit STC represent the STC divided by 300, not divided by 512; that is, the lower 9 bits of the 42-bit STC count up to 300, not to 512. Consequently, the upper 33 bits of the 42-bit STC represent a 90,000 KHz clock.

The determination of the values of fields stc_valid, stc_high, and stc_low shall take place during the read operation performed by the DASE Application; i.e., during the invocation of the method javax.tv.media.protocol.PushSourceStream2.readStream(...). A DASE System should minimize the latency between the determination of the values of these fields and the completion of (return from) this method.

The fields pts_valid, pts_high, and pts_low shall be determined as follows: if a presentation time stamp (PTS) is or can be associated with the picture user data from which the dtvcc_frame() is constructed, then pts_valid shall be set to '1' and the 33 significant bits of the associated PTS shall be extracted and placed into pts_high (PTS[32:32]) and pts_low (PTS[31:0]); otherwise, pts_valid shall be set to '0'.

The values of the two fields marked as reserved are expressly not defined by this specification; a DASE-1 Application shall not rely upon the values of these fields being any specific value.

Note: The values of these reserved fields may be assigned a specific, standardized value in a subsequent level of the DASE Standard.

The remaining fields of dtvcc_frame() shall be directly extracted from the identically named fields of the user_data() structure as specified by [A/53], Section 5.2.2, User Data Syntax.

A dtvcc_frame() instance shall correspond one-to-one with a user_data() instance; that is, multiple user_data() instances shall not be combined to form a single dtvcc_frame().

A DASE System should minimize any system latency when constructing a dtvcc_frame() from picture user data and when performing the subsequent invocation of SourceTransfer-Handler.transferData(...).

At most one dtvcc_frame() shall be transferred in a single invocation of javax.tv.media.protocol.PushSourceStream2.readStream(...). If fewer than 104 bytes are requested in
If data frames arrives more quickly than read operations occur, buffer overflow may occur, in which case a `javax.tv.media.protocol.DataLostException` shall be raised upon the next read operation.

5.1.1.2.2.4.2 Built-In Players

A procedural application environment shall implement the following built-in media players:

- video/mpeg
- video/mpv
- audio/ac3

Each built-in media player shall implement the interface `javax.media.Clock`; however, the implementation need not expose a time base or media time which is derived from content being controlled by the player. A DASE Application shall not rely upon the accuracy or synchronization of time information returned by a built-in player’s `javax.media.Clock` interface.

5.1.1.2.2.4.2.1 video/mpeg

A procedural application environment shall implement a built-in data player as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>content type</td>
<td>&quot;video/mpeg&quot;</td>
<td>1</td>
</tr>
<tr>
<td>controls</td>
<td>none required</td>
<td>2</td>
</tr>
<tr>
<td>data source access</td>
<td>not required</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes
1. See [DASE], Section 6.5.1.
2. If applicable, a procedural application environment should support the following controls on this player: `javax.media.GainControl`, `javax.tv.media.MediaSelectControl`, `org.davic.media.AudioLanguageControl`, and `org.davic.media.SubtitlingLanguageControl`.
3. Access to the data source for this player need not be provided to an application.

5.1.1.2.2.4.2.2 video/mpv

A procedural application environment shall implement a built-in data player as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>content type</td>
<td>&quot;video/mpv&quot;</td>
<td>1</td>
</tr>
<tr>
<td>controls</td>
<td>none required</td>
<td>2</td>
</tr>
<tr>
<td>data source access</td>
<td>not required</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes
1. See [DASE], Section 6.5.2.
2. If applicable, a procedural application environment should support the following controls on this player: `org.davic.media.SubtitlingLanguageControl`.
3. Access to the data source for this player need not be provided to an application.
5.1.1.2.2.4.2.3 audio/ac3

A procedural application environment shall implement a built-in data player as follows:

Table 9 Player Parameters: audio/ac3

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>content type</td>
<td>&quot;audio/ac3&quot;</td>
<td>1</td>
</tr>
<tr>
<td>controls</td>
<td>none required</td>
<td>2</td>
</tr>
<tr>
<td>data source access</td>
<td>not required</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes
1. See [DASE], Section 6.6.1.
2. If applicable, a procedural application environment should support the following controls on this player: javax.media.GainControl and org.davic.media.AudioLanguageControl.
3. Access to the data source for this player need not be provided to an application.

5.1.1.2.3 Java Television (Java TV) Interfaces

An application entity which adheres to this content type may use and a procedural application environment shall support the use of Java TV Specification, Version 1.0, APIs in a manner consistent with [JAVATV] and [JAVATV-INTRO], as extended and restricted below.

Note: See Annexes A.16 through A.28 for all required Java TV types.

5.1.1.2.3.1 Constraints

5.1.1.2.3.1.1 Constraints on javax.tv.carousel.CarouselFile class

The following constructors of javax.tv.carousel.CarouselFile shall be used only to access file or directory objects of an application delivery file system. If the CarouselFile instance would fail to associate with an application delivery file system object, then a java.io.IOException shall be raised.

- CarouselFile(java.lang.String)
- CarouselFile(java.lang.String, java.lang.String)
- CarouselFile(javax.tv.carousel.CarouselFile, java.lang.String)

Note: The constructor CarouselFile(javax.tv.locator.Locator) may be used to construct a CarouselFile instance associated with an unbounded resource which is not associated with an application delivery file system and which has no corresponding path in the local file system; e.g., an unbounded resource encapsulated as a module in the data carousel.

If an application entity invokes the inherited method canWrite(), then the value false shall be returned; furthermore, a procedural application environment shall not permit any write or modify operation to be performed by an application upon the underlying resource which represents a carousel file or directory object.

In the case that a CarouselFile instance is associated with a file object that has no corresponding path in the local file system, then invocation of the method CarouselFile.getCanonicalPath() shall cause a java.io.IOException or a subclass thereof to be raised.

When a method of CarouselFile would throw an instance of java.io.IOException, it shall instead throw an instance of the class org.atsc.carousel.CarouselException or a subclass thereof.
5.1.1.2.3.1.2 Constraints on javax.tv.graphics.TVContainer class

When returning normally, the method getRootContainer() shall return an instance of org.havi.ui.HScene.

If an embedded Xlet has an initial width or height of zero, then getRootContainer() shall return null. If an Xlet ever returns null from this method, then it shall never subsequently return a value which is not null.

Note: See Section 3.3 for the definition of embedded Xlet.

5.1.1.2.3.1.3 Constraints on javax.tv.locator.Locator interface

For any instance of Locator loc, the value of loc.toExternalForm() shall be a value such that the following method returns true.

```java
import javax.media.MediaLocator;
...

boolean testLocator ( Locator loc )
{
    MediaLocator ml      = new MediaLocator ( loc.toExternalForm() );
    Locator      locTest = LocatorFactory.createLocator ( ml.toExternalForm() );
    return locTest.equals ( loc );
}
```

Note: An application delivery system may impose additional constraints on the external form of a Locator.

5.1.1.2.3.1.4 Constraints on javax.tv.media.protocol.PushSourceStream2 interface

An application entity shall not invoke the following method on a class which implements the PushSourceStream2 interface:

- read(byte[],int,int)

An attempt by an application entity to invoke this method may cause a runtime exception to be raised.

Note: The method read(byte[],int,int) is inherited from the super-interface javax.media.protocol.PushSourceStream. An application entity using the derived interface PushSourceStream2 is expected to use readStream(byte[],int,int).

5.1.1.2.3.1.5 Constraints on javax.tv.service.SIManager class

The following methods shall employ a language identifier which adheres to the syntax prescribed by [LANG-TAGS]:

- getPreferredLanguage()
- setPreferredLanguage(java.lang.String)

5.1.1.2.3.1.6 Constraints on javax.tv.service.selection.ServiceContext interface

When selecting a service consisting of one or more Xlets and when returning normally, the method getServiceContentHandlers() shall return an array of one or more objects which implement org.atsc.xlet.XletComponentPresenterProxy. Furthermore, the Xlet whose proxy is represented by this XletComponentPresenterProxy shall be the Xlet which invokes this method.

Note: See [DASE-API] for further information on XletComponentPresenterProxy.
The method `getServiceContentHandlers()` should return an object corresponding to the active video and audio service components of the current service, if present.

*Note:* See Section 5.1.1.2.4.1.5 for further information on `getServiceContentHandlers()` as apply to a HAVi video device.

If an application makes use of multiple Xlets, then the objects returned by the method `getServiceContentHandlers()` shall be distinct for a distinct Xlet; however, the underlying content handlers which these objects represent shall be identical. For example, if an underlying video content handler $H_v$ and an underlying audio content handler $H_a$ are available within a service context, then for two Xlets $X_1$ and $X_2$ in a single application, two distinct sets of objects would be returned by this method, one for $X_1$: \{ $O_{V,1}$, $O_{A,1}$ \} and another for $X_2$: \{ $O_{V,2}$, $O_{A,2}$ \}; moreover, both $O_{V,1}$ and $O_{V,2}$ would control $H_v$, and both $O_{A,1}$ and $O_{A,2}$ would control $H_a$.

*Note:* Any synchronization which might be required in order for two Xlets to simultaneously control the same underlying content handler is implementation dependent. Content authors may wish to make use of application-level synchronization techniques to coordinate control of the same handler by multiple Xlets.

If an object returned by `getServiceContentHandlers()` implements the `ServiceMediaHandler` interface, then the JMF Player represented by the `ServiceMediaHandler` shall be in the `started` state, and, if it is presenting video, then that video shall be presenting on the background video device.

*Note:* See [JMF] javax.media.Player interface description for further information on a player’s `started` state.

If an application is resumed after service selection occurs, then an application shall not use any previously acquired service content handler returned by `getServiceContentHandlers()`, but shall re-acquire the service content handlers. A procedural application environment need not re-use the same service content handlers for a given application after service selection. If a service content handler is re-used and it supports the `ServiceMediaHandler` interface, then the JMF Player represented by the `ServiceMediaHandler` shall be reset to a default condition. In particular, all previously registered listeners shall be silently unregistered and any video scaling or positioning shall be reset.

5.1.1.2.3.1.7 Constraints on `javax.tv.service.selection.ServiceContextFactory` class

An application entity shall not subclass `ServiceContextFactory`; furthermore the protected constructor `ServiceContextFactory()` shall not be used by an application entity.

The method `getServiceContexts()` shall return no more than one instance of a `ServiceContext`; furthermore, that instance shall be the same instance as returned by `getServiceContext(XletContext)` where the `XletContext` argument is associated with the invoking Xlet.

If an application makes use of multiple Xlets, then the objects returned by the method `getServiceContexts()` and `getServiceContext(XletContext)` shall be distinct for a distinct Xlet; however, the underlying service context resources which these objects represent shall be identical.

5.1.1.2.3.1.8 Constraints on `javax.tv.service.selection.ServiceMediaHandler` interface

When returning normally, the method `getVisualComponent()` shall return an instance of `org.havi.ui.HVideoComponent`.

When returning normally and when returning a value other than `null`, the method `getControlPanelComponent()` shall return an instance of `org.havi.ui.HComponent`. 
Note: See [HAVI-UI-API] for further information on HVideoComponent and HComponent.

5.1.1.2.3.1.9 Constraints on use of javax.tv.xlet.Xlet interface

The argument to the method initXlet(XletContext) shall implement org.atsc.xlet.XletContextExt.

5.1.1.2.3.2 Modifications

5.1.1.2.3.2.1 Modifications to javax.tv.graphics.AlphaColor class

The following inherited fields in the javax.tv.graphics.AlphaColor class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these fields:
- BITMASK
- OPAQUE
- TRANSLUCENT

The following inherited methods in the javax.tv.graphics.AlphaColor class are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these methods:
- createContext(...)
- getColorComponents(float[])
- getColorComponents(ColorSpace, float[])
- getColorSpace()
- getComponents(float[])
- getComponents(ColorSpace, float[])
- getRGBColorComponents(float[])
- getRGBComponents(float[])
- getTransparency()

Note: The excluded fields and methods described above were erroneously specified in [JAVATV] as inherited from java.awt.Transparency and java.awt.Color as specified by [JDK1.2.2]; however, neither [JAVATV] nor [PJAE] includes the [JDK1.2.2] definitions of these types.

5.1.1.2.3.2.2 Modifications to javax.tv.service.transport package

The following interfaces in the javax.tv.service.transport package shall be provided by a procedural application environment; however, no class is required to implement these interfaces:
- Bouquet
- BouquetChangeListener
- BouquetCollection
- Network
- NetworkChangeListener
- NetworkCollection

Note: The ATSC Transport Stream, to which the DASE application delivery system is bound by default, does not support the semantics of these types; therefore, a procedural application environment which supports only the default application delivery system is not expected to implement or otherwise use these interfaces.
5.1.1.2.4 Home Audio Video Interoperability User Interface (HAVi UI) Interfaces

An application entity which adheres to this content type may use and a procedural application environment shall implement packages `org.havi.ui` and `org.havi.ui.event` as specified in HAVi Level 2 User Interface APIs, Version 1.1, May 15, 2001, [HAVI-UI-API], according to the semantics specified by The HAVi Specification, Chapter 8, Level 2 User Interface, Version 1.1, [HAVI-UI], as extended and restricted below.

*Note:* Within [HAVI-UI] and [HAVI-UI-API], the term *application* is to be equated with an individual Xlet, and not with a DASE Application, which may consist of multiple Xlets.

*Note:* See Annexes A.48 and A.49 for all required HAVi types.

5.1.1.2.4.1 Constraints

5.1.1.2.4.1.1 Constraints on `org.havi.ui.HGraphicsConfiguration` class

When invoked by an application, the following methods shall produce no side effect and shall raise a runtime exception:

- `getPunchThroughToBackgroundColor(java.awt.Color,int)`
- `getPunchThroughToBackgroundColor(java.awt.Color,int,HVideoDevice)`
- `getPunchThroughToBackgroundColor(int)`
- `getPunchThroughToBackgroundColor(int,HVideoDevice)`

5.1.1.2.4.1.2 Constraints on `org.havi.ui.HPermissionDeniedException` class

The `HPermissionDeniedException` shall be used only for resource management purposes and not for security purposes; it shall only be used to signal a transient state.

5.1.1.2.4.1.3 Constraints on `org.havi.ui.HScene` class

Within a procedural application, the `HScene` associated with the primary Xlet shall receive event focus by default. Only one instance of `HScene` shall be granted focus at any given time.

*Note:* The determination of when another Xlet in a procedural application should be granted focus is not defined by this specification. An Xlet may request focus be granted to an `HScene` by means of the method `java.awt.Component.requestFocus()` which is inherited by `HScene`.

When invoked by an Xlet within a declarative application, the inherited method `getBounds()` shall return a rectangle whose origins are (0,0). When invoked by an Xlet within a declarative application, the inherited method `getLocation()` shall return a point whose x and y coordinates are (0,0).

When invoked by an Xlet within a declarative application, the following methods shall produce no side effect and may raise a runtime exception:

- `setBounds(int,int,int,int)`
- `setBounds(Rectangle)`
- `setLocation(int,int)`
- `setLocation(Point)`
- `setSize(int,int)`
- `setSize(Dimension)`

*Note:* An Xlet in a declarative application may request the declarative application environment cause its position or size to be changed by making use of functionality provided by the `org.w3c.dom.css` package.
5.1.1.2.4.1.4 Constraints on org.havi.ui.HSceneFactory class

The value returned by the HSceneFactory.getDefaultHScene methods shall be the same value as returned by javax.tv.graphics.TVContainer.getRootContainer(). If this value is not null, then it shall be a distinct instance of HScene for each Xlet within a single DASE Application.

Note: In the case of an Xlet within a procedural application, the region of a screen which is allocated to an HScene is not defined by this specification.

A procedural application environment is not required to satisfy a request to create an instance of HScene using the method HSceneFactory.getBestScene().

A procedural application environment is not required to satisfy a request to resize an instance of HScene using the method HSceneFactory.resizeScene(); furthermore, this request shall not be satisfied when invoked by an Xlet within a declarative application.

When invoked by an Xlet within a declarative application, the method HSceneFactory.getFullScreenScene() shall return null.

5.1.1.2.4.1.5 Constraints on org.havi.ui.HVideoDevice class

When returning normally, the method HVideoDevice.getVideoController() shall return an instance of javax.tv.service.selection.ServiceMediaHandler which is in a prefetched or started state; furthermore, it shall only return a media handler which has already been created in response to the application invoking javax.media.Manager.createPlayer or which has been returned or would be returned by javax.tv.service.selection.getServiceContentHandlers.

When returning normally, the method HVideoDevice.getVideoSource() shall return an instance of javax.media.protocol.DataSource. If a video source is not available due to implementation restrictions, then an HPermissionDeniedException shall be raised.

5.1.1.2.5 Digital Audio Video Council (DAVIC) Interfaces

An application entity which adheres to this content type may use and a procedural application environment shall implement packages org.davic.media and org.davic.resources as specified by the following subsections and by [HAVI-UI-API], respectively.

Note: See Annexes A.46 and A.47 for all required DAVIC types.

5.1.1.2.5.1 Definitions

5.1.1.2.5.1.1 Definition of org.davic.media.AudioLanguageControl interface

public interface AudioLanguageControl
extends LanguageControl

This interface may be implemented by a JMF control in order to provide control over the selection of the language of an audio program element.

5.1.1.2.5.1.1.1 Methods

The following methods are inherited from LanguageControl: getCurrentLanguage, listAvailableLanguages, selectDefaultLanguage, and selectLanguage.

The following methods are inherited from javax.media.Control: getControlComponent.
5.1.1.2.5.1.2 Fields
No fields are defined.

5.1.1.2.5.1.2 Definition of org.davic.media.LanguageControl interface

public interface LanguageControl
  extends javax.media.Control

This interface is the base interface for both audio and subtitling language controls. This interface should never be implemented in a control alone, but always either as an audio or subtitling language control.

5.1.1.2.5.1.2.1 Methods
The following methods are inherited from javax.media.Control: getControlComponent.

5.1.1.2.5.1.2.1.1 getCurrentLanguage()

public java.lang.String getCurrentLanguage()

Obtain current language selected.

Returns:
A string which denotes the current language selection. The syntax of this string shall be that prescribed by [LANG-TAGS]. If the language selection is unknown, then the returned string shall be empty.

5.1.1.2.5.1.2.1.2 listAvailableLanguages()

public java.lang.String[] listAvailableLanguages()

Provides a list of available languages. If there are no selectable languages, the returned array is of zero length.

Returns:
A (possibly empty) array of strings, each of which denote a language. The syntax of each string shall be that prescribed by [LANG-TAGS].

5.1.1.2.5.1.2.1.3 selectDefaultLanguage()

public java.lang.String[] selectDefaultLanguage()
  throws NotAuthorizedException

Selects the default language.

Returns:
A string which denotes the default language selection. The syntax of this string shall be that prescribed by [LANG-TAGS]. If the default language selection is unknown, then the returned string shall be empty.

Throws:
NotAuthorizedException – if access to the default language is not permitted.

5.1.1.2.5.1.2.1.4 selectLanguage(java.lang.String)

public void selectLanguage(java.lang.String lang)
  throws LanguageNotAvailableException, NotAuthorizedException

Changes the language selection to the indicated language.
Parameters:
lang – a language tag which adheres to the syntax prescribed by [LANG-TAGS]

Throws:
LanguageNotAvailableException – if the specified language is not available.
NotAuthorizedException – if access to the default language is not permitted.

5.1.1.2.5.1.2.2 Fields
No fields are defined.

5.1.1.2.5.1.3 Definition of org.davic.media.LanguageNotAvailableException class

public class LanguageNotAvailableException
extends javax.media.MediaException

This exception is thrown when the requested language is not available.

5.1.1.2.5.1.3.1 Constructors

5.1.1.2.5.1.3.1.1 LanguageNotAvailableException()  
public LanguageNotAvailableException()
Constructor with no detail message.

5.1.1.2.5.1.3.1.2 LanguageNotAvailableException(java.lang.String)  
public LanguageNotAvailableException(java.lang.String reason)
Constructor taking a detail message.
Parameters:
reason – the reason this exception was thrown

5.1.1.2.5.1.3.2 Methods
The following methods are inherited from java.lang.Throwable: fillInStackTrace,
getLocalizedMessage, getMessage, printStackTrace(), printStackTrace(java.io.Print-
Stream), printStackTrace(java.io.PrintWriter), and toString.

The following methods are inherited from java.lang.Object: clone, equals, finalize,
getClass, hashCode, notify, notifyAll, wait(), wait(long), and wait(long, int).

5.1.1.2.5.1.3.3 Fields
No fields are defined.

5.1.1.2.5.1.4 Definition of org.davic.media.MediaPresentedEvent

public class MediaPresentedEvent
extends javax.media.ControllerEvent

Generated as soon as possible after new content is actually being presented to the end-
user, regardless of whether a state change has taken place in the player or not.
5.1.1.2.5.1.4.1  Constructors

5.1.1.2.5.1.4.1.1  MediaPresentedEvent (javax.media.Controller)

    public MediaPresentedEvent (javax.media.Controller source)

    Constructs a MediaPresentedEvent.
    Parameters:
    source  – the controller concerned

5.1.1.2.5.1.4.2  Methods

    The following methods are inherited from javax.media.ControllerEvent: getSource and
    getSourceController.

    The following methods are inherited from java.util.EventObject: toString.

    The following methods are inherited from java.lang.Object: clone, equals, finalize,
    getClass, hashCode, notify, notifyAll, wait(), wait (long), and wait(long, int).

5.1.1.2.5.1.4.3  Fields

    The following fields are inherited from java.util.EventObject: source.

5.1.1.2.5.1.5  Definition of org.davic.media.NotAuthorizedException class

    public class NotAuthorizedException extends java.security.AccessControlException

    This exception is thrown when the source cannot be accessed in order to reference the new
    content or the source has not been accepted.

5.1.1.2.5.1.5.1  Constructors

5.1.1.2.5.1.5.1.1  NotAuthorizedException()

    public NotAuthorizedException()

    Constructor with no detail message.

5.1.1.2.5.1.5.1.2  NotAuthorizedException (String)

    public NotAuthorizedException (java.lang.String reason)

    Constructor taking a detail message.
    Parameters:
    reason  – the reason this exception was thrown

5.1.1.2.5.1.5.2  Methods

    The following methods are inherited from java.lang.Throwable: fillInStackTrace,
    getLocalizedMessage, getMessage, printStackTrace(), printStackTrace(java.io.Print-
    Stream), printStackTrace(java.io.PrintWriter), and toString.

    The following methods are inherited from java.lang.Object: clone, equals, finalize,
    getClass, hashCode, notify, notifyAll, wait(), wait (long), and wait(long, int).

5.1.1.2.5.1.5.3  Fields

    No fields are defined.
5.1.1.2.5.1.6 Definition of org.davic.media.SubtitlingLanguageControl interface

```java
public interface SubtitlingLanguageControl extends LanguageControl
```

This interface may be implemented by a JMF control in order to provide control over the selection of the language of an available subtitling service.

*Note:* It is not required that any DASE System class implement this interface. This interface may be used by application defined JMF components to control subtitling available in application defined data.

*Note:* This functionality is not intended to be used to control closed captioning services delivered via [A/53] User Private Data.

### 5.1.1.2.5.1.6.1 Methods

The following methods are inherited from `LanguageControl.get_CurrentLanguage`, `listAvailableLanguages`, `select_DefaultLanguage`, and `selectLanguage`.

The following methods are inherited from `javax.media.Control.get_ControlComponent`.

#### 5.1.1.2.5.1.6.1.1 isSubtitlingOn()

```java
public boolean isSubtitlingOn()
```

Indicates whether subtitling is on or off.

Returns:

If subtitling is on, returns `true`; otherwise, returns `false`.

#### 5.1.1.2.5.1.6.1.2 setSubtitling()

```java
public boolean setSubtitling(boolean newValue)
```

Changes subtitling to on or off.

Parameters:

`newValue` — if `true`, then turns subtitling on; otherwise, turns it off.

Returns:

The previous value.

#### 5.1.1.2.5.1.6.2 Fields

No fields are defined.

### 5.1.1.2.5.2 Modifications

#### 5.1.1.2.5.2.1 Modification to org.davic.resource.ResourceStatusEvent class

The class of `ResourceStatusEvent` shall be a subtype of the `java.util.EventObject` class.

### 5.1.1.2.6 W3C Document Object Model (DOM) Interfaces

An application entity which adheres to this content type may use and a procedural application environment shall implement packages `org.w3c.dom`, `org.w3c.dom.css`, `org.w3c.dom.events`, `org.w3c.dom.html2`, `org.w3c.dom.stylesheets`, and
org.w3c.dom.views as specified in [DOM2], [DOM2-EVENTS], [DOM2-HTML], [DOM2-STYLE], and [DOM2-VIEWS] as extended and restricted below.

Note: See Annexes A.50 through A.55 for all required W3C DOM types.

5.1.1.2.6.1 Modifications

5.1.1.2.6.1.1 Modifications to org.w3c.dom.css package

The following interfaces in the org.w3c.dom.css package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these interfaces:

- CSSPageRule
- CSS2Properties

Note: The functionality of the CSS2Properties interface may be obtained by using other interfaces defined in package org.w3c.dom.css, particularly the ElementCSSInlineStyle and CSSStyleDeclaration interfaces.

5.1.1.2.6.1.2 Modifications to org.w3c.dom.html2 package

The following interfaces in the org.w3c.dom.html2 package are not required to be implemented by a procedural application environment; furthermore, an application entity shall not rely on the presence of support for these interfaces:

- HTMLAppletElement
- HTMLAreaElement
- HTMLBaseElement
- HTMLBaseFontElement
- HTMLBRElement
- HTMLButtonElement
- HTMLDirectoryElement
- HTMLDivElement
- HTMLDListElement
- HTMLFieldSetElement
- HTMLFontElement
- HTMLFrameElement
- HTMLFrameSetElement
- HTMLHeadElement
- HTMLHeadingElement
- HTMLHRElement
- HTMLHtmlElement
- HTMLIFrameElement
- HTMLIsIndexElement
- HTMLLabelElement
- HTMLLegendElement
- HTMLLIElement
- HTMLLinkElement
- HTMLMapElement
- HTMLMenuElement
- HTMLMetaElement
- HTMLModElement
- HTMLOListElement
• HTMLOptGroupElement
• HTMLParagraphElement
• HTMLParamElement
• HTMLPreElement
• HTMLQuoteElement
• HTMLScriptElement
• HTMLStyleElement
• HTMLTableCaptionElement
• HTMLTableCellElement
• HTMLTableColElement
• HTMLTableElement
• HTMLTableRowElement
• HTMLTableSectionElement
• HTMLTitleElement
• HTMLUListElement

Note: The functionality of the preceding interfaces may be obtained by using interfaces defined in package org.w3c.dom, particularly the Node, Element, and Attr interfaces.

5.1.1.2.7 DASE Specific (ATSC) Interfaces

An application entity which adheres to this content type may use and a procedural application environment shall implement all facilities specified in DASE Application Programming Interface [DASE-API].

All package, class, and interface names that have the prefix org.atsc are reserved for the sole use of the ATSC. An implementation of a procedural application environment shall not superset the org.atsc package namespace unless required or permitted by a future level or edition of the DASE Standard.

If a procedural application environment makes use of a local file system to persist DASE specific registry state, including ApplicationRegistry, PreferencesRegistry, and UserRegistry, and access to this file system is provided to application entities by means of java.io functionality, then no access to this registry state shall be granted to application entities by means of java.io functionality.

Note: See Annexes A.29 through A.45 for all required ATSC types.

5.1.1.2.7.1 Constraints

5.1.1.2.7.1.1 Constraints on org.atsc.preferences.PreferenceRegistry interface

A procedural application environment shall maintain any state changes due to the addition or removal of preferences through the PreferenceRegistry interface for no less time than the duration of the current application.

5.1.1.2.7.1.2 Constraints on org.atsc.user.UserRegistry interface

A procedural application environment shall maintain any state changes due to the creation or deletion of users through the UserRegistry interface for no less time than the duration of the current application.
5.1.1.2.7.1.3 Constraints on org.atsc.xlet.XletRegistry interface

A procedural application environment shall maintain any state changes due to registration of Xlets through the XletRegistry interface for no less time than the duration of the current application.

Note: An application's duration is the interval from when an application is placed in the initialized state until the time when it is placed in the uninitialized state.

5.1.1.3 Interface Implementation Constraints

This section describes additional constraints on active object content and on a procedural application environment's implementation of the interfaces specified in Section 5.1.1.2, Java Application Programming Interfaces.

5.1.1.3.1 Instance Sharing

A procedural application environment shall not permit direct instance sharing of application-defined classes between two or more Xlets.

Note: Two Xlets may reference the same system object in certain cases. For example, if two Xlets request the same system property, the same string instance may be returned. This kind of sharing is harmless, because String instances are immutable.

5.1.1.3.2 Finalizers

An Xlet shall not rely upon an application-defined finalizer being invoked by the procedural application environment.

5.1.1.3.3 Class Loaders

A procedural application environment shall associate a distinct java.lang.ClassLoader instance with each Xlet instance. This java.lang.ClassLoader instance shall be used to load all of the classes that comprise a distinct Xlet.

5.1.2 application/javatv-xlet

This active object content type shall adhere to the specification of application/java content as specified above, and, in addition, shall implement the javax.tv.xlet.Xlet interface as specified by [JAVATV]. This content shall be identified as content type application/javatv-xlet.

5.2 Application Defined Content

This facility consists of a generic content type which may be used by an application to implement its own content types.

5.2.1 application/octet-stream

This content type shall consist of an arbitrary length sequence of arbitrary octets (8-bit bytes).

5.3 Text Content

This facility consists of a generic content type which is used in specific cases to represent text oriented data.
5.3.1  text/plain

This content type shall consist of an arbitrary length sequence of arbitrary encoded characters, where such a sequence is referred to generically as plain text.

An application entity which employs this content type shall specify one of the following character encoding systems in a charset parameter in accordance with [MIME-MEDIA], Section 4.1.2, and, furthermore, the entity’s representation shall employ the specified encoding system as its actual character encoding system:

- "UTF-8"
- "ISO-8859-1"
- "US-ASCII"

If no character encoding system is specified or if the actual character encoding system does not correspond to the specified encoding system, then the application entity shall be considered to be not well-formed, and shall cause an exception to be raised if an attempt is made to read the entity.

Note: In DASE-1, the use of this content type is limited to two cases: (1) to represent a property list resource (see Section 5.1.1.2.1.10.4), and (2) to represent textual oriented application defined content.

5.4  Java Archive Content

Java archive content comprises content types that serve as packages for one or more application resources. Java archive content shall adhere to one of the following content types as specified below:

Table 10 Java Archive Content Types

<table>
<thead>
<tr>
<th>application/jar</th>
<th>Java Archive</th>
</tr>
</thead>
</table>

If an entity of a DASE Application takes the form of an archive content type other than one of the above specified types, and the entity is processed, then a DASE System shall not abort the application.

Application entities represented as Java archive content are not presented as such; in contrast, application resources embodied within Java archive content may be presented according to their specific content types.

5.4.1  application/jar

An application entity identified as content type application/jar shall consist of a Java Archive. A Java Archive shall adhere to the application/zip content type as defined by [DASE], Section 6.8.1, and additionally shall contain a manifest entry which adheres to [JAR].

An application entity which employs this content type shall be valid. An entity identified as this content type is valid if it adheres to the encoding format and constraints specified by the application/zip content type and those specified by [JAR].

If an entity of a DASE Application uses content type application/jar, is not valid, and the entity is processed, then a DASE System shall not abort the application.

If a Content-Type per-entry attribute is present in a manifest entry, then its value shall be identical to the value of the Content-Type MIME header extension which applies to the entry in accordance with [DASE], Section 6.8.1. In case of a conflict, the MIME header extension shall be given priority.
A procedural application environment is not required to check or otherwise verify the validity of any digital signature specified in a manifest entry; furthermore, an application entity shall not rely on the presence of support for validating a digital signature present in a manifest entry.

*Note:* Limited programmatic access to an application entity that uses content type `application/jar` may be obtained by use of functionality defined in the `java.util.zip` package.
ANNEX A. REQUIRED JAVA TYPES

The entirety of this annex and its subsections is normative.

This annex specifies, on a package by package basis, all system-defined Java types which may be referenced by active object content and which shall be supported by a procedural application environment.

In addition to the Java types specified here, additional binding dependent types may be required according the applicable application delivery system.

If active object content requires resolution of a reference to a Java type other than (1) the types specified by this annex, (2) binding dependent types specified by the application delivery system, or (3) an application-defined type, and the active object content is processed, then a procedural application environment may destroy the Xlet in whose context the reference occurs.

Note: Each of the following subsections specifies all required Java types for a specific package. No significance is to be attributed to the tabular representation of these types; they are specified in alphabetic order from top to bottom in multiple columns.

A.1 java.awt

<table>
<thead>
<tr>
<th>Class</th>
<th>Class</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustable</td>
<td>Cursor</td>
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</tr>
<tr>
<td>AWTError</td>
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<td>AWTEvent</td>
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<tr>
<td>AWTEventMulticaster</td>
<td>FlowLayout</td>
<td>LayoutManager</td>
</tr>
<tr>
<td>AWTException</td>
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<tr>
<td>AWTPermission</td>
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<td>MediaTracker</td>
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<tr>
<td>BorderLayout</td>
<td>Graphics</td>
<td>Point</td>
</tr>
<tr>
<td>CardLayout</td>
<td>GridBagConstraints</td>
<td>Polygon</td>
</tr>
<tr>
<td>Color</td>
<td>GridBagConstraints</td>
<td>Rectangle</td>
</tr>
<tr>
<td>Component</td>
<td>GridBagConstraints</td>
<td>Shape</td>
</tr>
<tr>
<td>Container</td>
<td>IllegalComponentStateException</td>
<td>Toolkit</td>
</tr>
</tbody>
</table>

A.2 java.awt.event

<table>
<thead>
<tr>
<th>Event</th>
<th>Adapter</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>ActionEvent</td>
<td>FocusAdapter</td>
<td>MouseEvent</td>
</tr>
<tr>
<td>ActionListener</td>
<td>FocusEvent</td>
<td>MouseListener</td>
</tr>
<tr>
<td>AdjustmentEvent</td>
<td>FocusListener</td>
<td>MouseMotionAdapter</td>
</tr>
<tr>
<td>AdjustmentListener</td>
<td>InputEvent</td>
<td>MouseMotionListener</td>
</tr>
<tr>
<td>ComponentAdapter</td>
<td>ItemEvent</td>
<td>PaintEvent</td>
</tr>
<tr>
<td>ComponentEvent</td>
<td>ItemListener</td>
<td>TextEvent</td>
</tr>
<tr>
<td>ComponentListener</td>
<td>KeyAdapter</td>
<td>TextListener</td>
</tr>
<tr>
<td>ContainerAdapter</td>
<td>KeyEvent</td>
<td>WindowAdapter</td>
</tr>
<tr>
<td>ContainerEvent</td>
<td>KeyListener</td>
<td>WindowEvent</td>
</tr>
<tr>
<td>ContainerListener</td>
<td>MouseAdapter</td>
<td>WindowListener</td>
</tr>
</tbody>
</table>

A.3 java.awt.image

<table>
<thead>
<tr>
<th>Class</th>
<th>Class</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>AreaAveragingScaleFilter</td>
<td>ImageConsumer</td>
<td>MemoryImageSource</td>
</tr>
<tr>
<td>ColorModel</td>
<td>ImageFilter</td>
<td>PixelGrabber</td>
</tr>
<tr>
<td>CropImageFilter</td>
<td>ImageObserver</td>
<td>ReplicateScaleFilter</td>
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<tr>
<td>DirectColorModel</td>
<td>ImageProducer</td>
<td>RGBImageFilter</td>
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<tr>
<td>FilteredImageSource</td>
<td>IndexColorModel</td>
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</tbody>
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<th>Beans</th>
<th>PropertyChangeSupport</th>
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</tr>
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<tbody>
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<td>PropertyVetoException</td>
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</tr>
<tr>
<td>PropertyChangeListener</td>
<td>VetoableChangeListener</td>
<td></td>
</tr>
</tbody>
</table>

### A.5 java.io

<table>
<thead>
<tr>
<th>BufferedInputStream</th>
<th>FileWriter</th>
<th>OutputStreamWriter</th>
</tr>
</thead>
<tbody>
<tr>
<td>BufferedOutputStream</td>
<td>FilterInputStream</td>
<td>PipedInputStream</td>
</tr>
<tr>
<td>BufferedReader</td>
<td>FilterOutputStream</td>
<td>PipedOutputStream</td>
</tr>
<tr>
<td>BufferedWriter</td>
<td>FilterReader</td>
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</tr>
<tr>
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<td>CharArrayWriter</td>
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<td>CharConversionException</td>
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<td>PushbackReader</td>
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<td>Reader</td>
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<td>DataOutputStream</td>
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<td>DataOutputStream</td>
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<tr>
<td>EOFException</td>
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</tr>
<tr>
<td>Externalizable</td>
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<td>FileDescriptor</td>
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<tr>
<td>FileInputStream</td>
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<td>FilenameFilter</td>
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<td>FileNotFoundException</td>
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<tr>
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<td>WriteAbortedException</td>
</tr>
<tr>
<td>FileReader</td>
<td>OutputStream</td>
<td>Writer</td>
</tr>
</tbody>
</table>

### A.6 java.lang

| AbstractMethodError | IllegalMonitorStateException | OutOfMemoryError |
| ArithmeticException | IllegalStateException      | Runnable         |
| ArrayIndexOutOfBoundsException | IllegalThreadStateException | RuntimeException |
| ArrayStoreException | IncompatibleClassChangeError | RuntimeException |
| Boolean            | IndexOutOfBoundsException  | RuntimeException |
| Byte               | InstantiationException      | SecurityException |
| Character          | InstantiationException      | SecurityManager  |
| Class              | Integer                     | Short             |
| ClassCastException | InternalError              | StackOverflowError |
| ClassCircularityError | InterruptedException | String            |
| ClassFormatError   | LinkageError               | StringBuffer      |
| ClassLoader        | Long                        | StringIndexOutOfBoundsException |
| ClassNotFoundException | Math | System |
| Cloneable          | NegativeArraySizeException | Thread            |
| CloneNotSupportedException | NoClassDefFoundError | ThreadDeath       |
| Double             | NoSuchFieldError           | ThreadGroup       |
| Error              | NoSuchFieldException       | Throwable          |
| Exception          | NoSuchMethodError          | UnknownError       |
| ExceptionInInitializerError | NoSuchMethodException | UnsatisfiedLinkError |
| Float              | NullPointerException       | UnSupportedOperationException |
| IllegalAccessError | Number                      | VerifyError        |
| IllegalAccessException | NumberFormatException   | VirtualMachineError |
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### A.7 java.lang.reflect

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</thead>
<tbody>
<tr>
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<td>Array</td>
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<tr>
<td>Constructor</td>
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<td>ReflectPermission</td>
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### A.8 java.net

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<th>Exception</th>
<th>Exception</th>
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</thead>
<tbody>
<tr>
<td>BindException</td>
<td>MalformedURLException</td>
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</tr>
<tr>
<td>DatagramPacket</td>
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<td>DatagramSocket</td>
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<tr>
<td>InetAddress</td>
<td>SocketException</td>
<td>URLDecoder</td>
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</table>

### A.9 java.security

<table>
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<tr>
<th>Class</th>
<th>KeyException</th>
<th>ProtectionDomain</th>
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</thead>
<tbody>
<tr>
<td>AccessControlContext</td>
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<td>AccessController</td>
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<td>BasicPermission</td>
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<td>DigestOutputStream</td>
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<td>Policy</td>
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<td>Guard</td>
<td>Principal</td>
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<td>GuardedObject</td>
<td>PrivilegedAction</td>
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<td>InvalidKeyException</td>
<td>PrivilegedActionException</td>
<td>UnresolvedPermission</td>
</tr>
<tr>
<td>Key</td>
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</table>

### A.10 java.security.cert

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<tr>
<th>Class</th>
<th>CertificateEncodingException</th>
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</tr>
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### A.11 java.text

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<th>NumberFormat</th>
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</thead>
<tbody>
<tr>
<td>ChoiceFormat</td>
<td>DecimalFormatSymbols</td>
<td>NumberFormat</td>
</tr>
<tr>
<td>DateFormat</td>
<td>FieldPosition</td>
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<td>ParsePosition</td>
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### A.12 java.util

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<th>Hashable</th>
<th>PropertyResourceBundle</th>
</tr>
</thead>
<tbody>
<tr>
<td>BitSet</td>
<td>Hashable</td>
<td>PropertyResourceBundle</td>
</tr>
<tr>
<td>Calendar</td>
<td>ListResourceBundle</td>
<td>Random</td>
</tr>
<tr>
<td>Date</td>
<td>Locale</td>
<td>ResourceBundle</td>
</tr>
<tr>
<td>Dictionary</td>
<td>MissingResourceException</td>
<td>SimpleTimeZone</td>
</tr>
<tr>
<td>EmptyStackException</td>
<td>NoSuchElementException</td>
<td>Stack</td>
</tr>
<tr>
<td>Enumeration</td>
<td>Observable</td>
<td>Stringtokenizer</td>
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<tr>
<td>EventListener</td>
<td>Observable</td>
<td>Timezone</td>
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<tr>
<td>EventObject</td>
<td>Properties</td>
<td>TooManyListenersException</td>
</tr>
<tr>
<td>GregorianCalendar</td>
<td>PropertyPermission</td>
<td>Vector</td>
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### A.13 java.util.zip

<table>
<thead>
<tr>
<th>Class</th>
<th>DataFormatException</th>
<th>ZipEntry</th>
</tr>
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<tbody>
<tr>
<td>CheckedInputStream</td>
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<td>ZipEntry</td>
</tr>
<tr>
<td>CheckedOutputStream</td>
<td>Inflater</td>
<td>ZipException</td>
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<td>Checksum</td>
<td>InflaterInputStream</td>
<td>ZipFile</td>
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<td>CRC32</td>
<td>ZipConstants</td>
<td>ZipInputStream</td>
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### A.14 javax.media

<table>
<thead>
<tr>
<th>Event/Exception</th>
<th>Class/Interface</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CachingControl</td>
<td>GainChangeListener</td>
<td>PackageManager</td>
</tr>
<tr>
<td>CachingControlEvent</td>
<td>GainChangeListener</td>
<td>PackageManager</td>
</tr>
<tr>
<td>Clock</td>
<td>GainControl</td>
<td>Player</td>
</tr>
<tr>
<td>ClockStartedError</td>
<td>IncompatibleSourceException</td>
<td>PrefetchCompleteEvent</td>
</tr>
<tr>
<td>ClockStoppedException</td>
<td>IncompatibleTimeBaseException</td>
<td>RateChangeEvent</td>
</tr>
<tr>
<td>ConnectionErrorEvent</td>
<td>InternalErrorEvent</td>
<td>RealizeCompleteEvent</td>
</tr>
<tr>
<td>Control</td>
<td>Manager</td>
<td>ResourceUnavailableEvent</td>
</tr>
<tr>
<td>Controller</td>
<td>MediaError</td>
<td>RestartingEvent</td>
</tr>
<tr>
<td>ControllerClosedEvent</td>
<td>MediaEvent</td>
<td>StartEvent</td>
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<tr>
<td>ControllerErrorEvent</td>
<td>MediaException</td>
<td>StopAtTimeEvent</td>
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<tr>
<td>ControllerEvent</td>
<td>MediaHandler</td>
<td>StopByRequestEvent</td>
</tr>
<tr>
<td>ControllerListener</td>
<td>MediaLocator</td>
<td>StopEvent</td>
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<tr>
<td>DataStarvedEvent</td>
<td>MediaProxy</td>
<td>StopTimeChangeEvent</td>
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<tr>
<td>DeallocateEvent</td>
<td>MediaTimeSetEvent</td>
<td>StopTimeSetError</td>
</tr>
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<td>Duration</td>
<td>NoDataSourceException</td>
<td>Time</td>
</tr>
<tr>
<td>DurationUpdateEvent</td>
<td>NoPlayerException</td>
<td>TimeBase</td>
</tr>
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<td>EndOfMediaEvent</td>
<td>NotPrefetchedError</td>
<td>TransitionEvent</td>
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### A.15 javax.media.protocol

<table>
<thead>
<tr>
<th>Class/Interface</th>
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<tbody>
<tr>
<td>ContentDescriptor</td>
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<tr>
<td>Controls</td>
<td>PushDataSource</td>
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<td>DataSource</td>
<td>PushSourceStream</td>
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<td>Positionable</td>
<td>RateConfigurable</td>
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<td>PullDataSource</td>
<td>RateConfiguration</td>
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### A.16 javax.tv.carousel

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CarouselFile</td>
<td>CarouselFileChangeEvent</td>
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### A.17 javax.tv.graphics

<table>
<thead>
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<tr>
<td>AlphaColor</td>
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### A.18 javax.tv.locator

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### A.19 javax.tv.media

<table>
<thead>
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<tr>
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<td>MediaSelectControl</td>
</tr>
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<td>AWTVideoSizeControl</td>
<td>MediaSelectEvent</td>
</tr>
<tr>
<td>MediaSelectCARefusedEvent</td>
<td>MediaSelectFailedEvent</td>
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### A.20 javax.tv.media.protocol

<table>
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<tr>
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### A.21 javax.tv.net

<table>
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<tr>
<td>InterfaceMap</td>
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### A.22 javax.tv.service

<table>
<thead>
<tr>
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<tr>
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<td>ReadPermission</td>
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<td>Service</td>
<td>SIChangeListener</td>
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<td>-----------------</td>
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<td>ServiceInformationType</td>
<td>SIChangeEvent</td>
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<td>ServiceMinorNumber</td>
<td>SIElement</td>
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<td>ServiceNumber</td>
<td>SIException</td>
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### A.23  `javax.tv.service.guide`

<table>
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<th>SIRequestFailureType</th>
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<td>ProgramScheduleListener</td>
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<td>ProgramEvent</td>
<td>ProgramScheduleChangeType</td>
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### A.24  `javax.tv.service.navigation`

<table>
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<tr>
<td>CAIdentification</td>
<td>ServiceComponentChangeEvent</td>
<td>ServiceList</td>
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<td>ServiceProviderInformation</td>
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<td>FavoriteServicesName</td>
<td>ServiceDescription</td>
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<td>FilterNotSupportedException</td>
<td>ServiceDetails</td>
<td>SIElementFilter</td>
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<td>SortNotAvailableException</td>
</tr>
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<td>PreferenceFilter</td>
<td>ServiceFilter</td>
<td>StreamType</td>
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### A.25  `javax.tv.service.selection`

<table>
<thead>
<tr>
<th>Service</th>
<th>SIChangeListener</th>
<th>SIRequestFailureType</th>
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<tbody>
<tr>
<td>AlternativeContentEvent</td>
<td>SelectionFailedEvent</td>
<td>ServiceContextException</td>
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<tr>
<td>InsufficientResourcesException</td>
<td>SelectPermission</td>
<td>ServiceContextFactory</td>
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<td>InvalidServiceComponentException</td>
<td>ServiceContentHandler</td>
<td>ServiceContextListener</td>
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<td>NormalContentEvent</td>
<td>ServiceContext</td>
<td>ServiceContextPermission</td>
</tr>
<tr>
<td>PresentationChangedEvent</td>
<td>ServiceContextDestroyedEvent</td>
<td>ServiceMediaHandler</td>
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<td>PresentationTerminatedEvent</td>
<td>ServiceContextEvent</td>
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### A.26  `javax.tv.service.transport`

<table>
<thead>
<tr>
<th>Service</th>
<th>SIChangeListener</th>
<th>SIRequestFailureType</th>
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<tr>
<td>Bouquet</td>
<td>NetworkChangeListener</td>
<td>TransportStream</td>
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<tr>
<td>BouquetChangeEvent</td>
<td>NetworkCollection</td>
<td>TransportStreamChangeEvent</td>
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<tr>
<td>BouquetChangeListener</td>
<td>ServiceDetailsChangeEvent</td>
<td>TransportStreamChangeListener</td>
</tr>
<tr>
<td>BouquetCollection</td>
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<td>TransportStreamCollection</td>
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<td>Transport</td>
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### A.27  `javax.tv.util`

<table>
<thead>
<tr>
<th>Service</th>
<th>SIChangeListener</th>
<th>SIRequestFailureType</th>
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<tbody>
<tr>
<td>TVTimer</td>
<td>TVTimerSpec</td>
<td>TVTimerWentOffEventListener</td>
</tr>
<tr>
<td>TVTimerScheduleFailedException</td>
<td>TVTimerWentOffEvent</td>
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### A.28  `javax.tv.xlet`

<table>
<thead>
<tr>
<th>Service</th>
<th>SIChangeListener</th>
<th>SIRequestFailureType</th>
</tr>
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<tbody>
<tr>
<td>Xlet</td>
<td>XletContext</td>
<td>XletStateChangeException</td>
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</table>

### A.29  `org.atsc.application`

| Service | SIChangeListener | SIRequestFailureType |

| ApplicationInformation |

### A.30  `org.atsc.carousel`

<table>
<thead>
<tr>
<th>Service</th>
<th>SIChangeListener</th>
<th>SIRequestFailureType</th>
</tr>
</thead>
<tbody>
<tr>
<td>CarouselException</td>
<td>InsufficientResourceException</td>
<td>NotAuthorizedException</td>
</tr>
<tr>
<td>DataDeliveryException</td>
<td>InvalidFormatException</td>
<td>TimeoutException</td>
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</table>
### A.31 org.atsc.dom

<table>
<thead>
<tr>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>DocumentAction</td>
</tr>
<tr>
<td>DOMExceptionExt</td>
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<tr>
<td>DocumentFactory</td>
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<tr>
<td>MultipleDocumentsAction</td>
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### A.32 org.atsc.dom.environment

<table>
<thead>
<tr>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
</tr>
<tr>
<td>Navigator</td>
</tr>
<tr>
<td>Location</td>
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<tr>
<td>Window</td>
</tr>
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</table>

### A.33 org.atsc.dom.events

<table>
<thead>
<tr>
<th>Class</th>
</tr>
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<tbody>
<tr>
<td>KeyEvent</td>
</tr>
<tr>
<td>KeyModifiers</td>
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<tr>
<td>VirtualKeys</td>
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### A.34 org.atsc.dom.html

<table>
<thead>
<tr>
<th>Class</th>
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<tbody>
<tr>
<td>HTMLAnchorElementExt</td>
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<tr>
<td>HTMLFormElementExt</td>
</tr>
<tr>
<td>HTMLObjectElementExt</td>
</tr>
<tr>
<td>HTMLDocumentExt</td>
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<tr>
<td>HTMLImageElementExt</td>
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### A.35 org.atsc.dom.views

<table>
<thead>
<tr>
<th>Class</th>
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<tbody>
<tr>
<td>DocumentViewExt</td>
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</table>

### A.36 org.atsc.graphics

<table>
<thead>
<tr>
<th>Class</th>
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</thead>
<tbody>
<tr>
<td>AtscBufferedImage</td>
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<tr>
<td>FontFactory</td>
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<tr>
<td>FontFormatException</td>
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### A.37 org.atsc.management

<table>
<thead>
<tr>
<th>Class</th>
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<tbody>
<tr>
<td>AdministrativeState</td>
</tr>
<tr>
<td>OperationalState</td>
</tr>
<tr>
<td>StateChangeListener</td>
</tr>
<tr>
<td>AlarmStatus</td>
</tr>
<tr>
<td>ProceduralStatus</td>
</tr>
<tr>
<td>StatusChangeListener</td>
</tr>
<tr>
<td>AvailabilityStatus</td>
</tr>
<tr>
<td>SourceIndicator</td>
</tr>
<tr>
<td>UsageState</td>
</tr>
<tr>
<td>ManagementPermission</td>
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<td>StateChangeEvent</td>
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<td>ObjectStates</td>
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<td>StateChangeException</td>
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### A.38 org.atsc.net

<table>
<thead>
<tr>
<th>Class</th>
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<tbody>
<tr>
<td>DatagramSocketBufferControl</td>
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### A.39 org.atsc.preferences

<table>
<thead>
<tr>
<th>Class</th>
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<tbody>
<tr>
<td>FavoriteChannelsPreference</td>
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<tr>
<td>Preference</td>
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<tr>
<td>PreferencePermission</td>
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<tr>
<td>InvalidPreferenceException</td>
</tr>
<tr>
<td>PreferenceChangeCause</td>
</tr>
<tr>
<td>PreferenceRegistry</td>
</tr>
<tr>
<td>LanguagePreference</td>
</tr>
<tr>
<td>PreferenceChangeEvent</td>
</tr>
<tr>
<td>PreferenceRegistryEvent</td>
</tr>
<tr>
<td>LanguageScope</td>
</tr>
<tr>
<td>PreferenceChangeListener</td>
</tr>
<tr>
<td>RatingPreference</td>
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<tr>
<td>PersonalDataPreference</td>
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<td>PreferenceNames</td>
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### A.40 org.atsc.registry

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<thead>
<tr>
<th>Class</th>
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<tbody>
<tr>
<td>Registry</td>
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<tr>
<td>RegistryChangeEvent</td>
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<tr>
<td>RegistryFactory</td>
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<tr>
<td>RegistryChangeCause</td>
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<tr>
<td>RegistryChangeListener</td>
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<td>RegistryType</td>
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### A.41 org.atsc.security

<table>
<thead>
<tr>
<th>Class</th>
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<tbody>
<tr>
<td>AccessDeniedException</td>
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<tr>
<td>AtscPermission</td>
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<td>AtscAllPermission</td>
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<td>HAViPermission</td>
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### A.42 org.atsc.system

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver</td>
<td>ReceiverPropertyNames</td>
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### A.43 org.atsc.trigger

<table>
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<tr>
<th>Class</th>
<th>Description</th>
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<tr>
<td>TriggerEvent</td>
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<td>TriggerSource</td>
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### A.44 org.atsc.user

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>InvalidCapabilityException</td>
<td>UserChangeCause</td>
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<td></td>
<td>UserRegistry</td>
</tr>
<tr>
<td>InvalidUserException</td>
<td>UserPermission</td>
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<td>UserRegistryEvent</td>
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### A.45 org.atsc.xlet

<table>
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<tr>
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<td>XletAlreadyRegisteredException</td>
<td>XletContextExt</td>
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<tr>
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<td>XletProxy</td>
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<tr>
<td>XletAvailabilityException</td>
<td>XletInformation</td>
</tr>
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<td>XletRegistry</td>
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<tr>
<td>XletChangeCause</td>
<td>XletNotRegisteredException</td>
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### A.46 org.davic.media

<table>
<thead>
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<th>Class</th>
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<td>MediaPresentedEvent</td>
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### A.47 org.davic.resources

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<td>ResourceStatusListener</td>
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### A.48 org.havi.ui

<table>
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<td>HImageHints</td>
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<td>HAdjustableLook</td>
<td>HImageMatte</td>
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**ANNEX B. JAVA CONSTANTS**

The entirety of this annex is normative.

This annex specifies the values of certain public static final (constant) fields of Java types for which a value is not otherwise specified in the referenced document in which the type is defined and not specified above. A procedural application environment shall use the values defined below.

**Table 11 Java Constants**

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<td>SUNDAY</td>
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</tr>
<tr>
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<td>THURSDAY</td>
<td>5</td>
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<tr>
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<td>java.util</td>
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<td>12</td>
</tr>
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<td>Calendar</td>
<td>WEDNESDAY</td>
<td>4</td>
</tr>
<tr>
<td>java.util</td>
<td>Calendar</td>
<td>WEEK_OF_MONTH</td>
<td>4</td>
</tr>
<tr>
<td>java.util</td>
<td>Calendar</td>
<td>WEEK_OF_YEAR</td>
<td>3</td>
</tr>
<tr>
<td>java.util</td>
<td>Calendar</td>
<td>YEAR</td>
<td>1</td>
</tr>
<tr>
<td>java.util</td>
<td>Calendar</td>
<td>ZONE_OFFSET</td>
<td>15</td>
</tr>
<tr>
<td>java.util</td>
<td>GregorianCalendar</td>
<td>AD</td>
<td>1</td>
</tr>
<tr>
<td>java.util</td>
<td>GregorianCalendar</td>
<td>BC</td>
<td>0</td>
</tr>
<tr>
<td>Package</td>
<td>Class or Interface</td>
<td>Field Name</td>
<td>Value</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------</td>
<td>---------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>java.util.zip</td>
<td>ZipEntry</td>
<td>DEFLATED</td>
<td>8</td>
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<tr>
<td>java.util.zip</td>
<td>ZipEntry</td>
<td>STORED</td>
<td>0</td>
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<tr>
<td>javax.media</td>
<td>CachingControl</td>
<td>LENGTH_UNKNOWN</td>
<td>java.lang.Long.MAX_VALUE</td>
</tr>
<tr>
<td>javax.media</td>
<td>Controller</td>
<td>Prefetched</td>
<td>500</td>
</tr>
<tr>
<td>javax.media</td>
<td>Controller</td>
<td>Prefetching</td>
<td>400</td>
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<td>Controller</td>
<td>Realized</td>
<td>300</td>
</tr>
<tr>
<td>javax.media</td>
<td>Controller</td>
<td>Realizing</td>
<td>200</td>
</tr>
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<td>javax.media</td>
<td>Controller</td>
<td>Started</td>
<td>600</td>
</tr>
<tr>
<td>javax.media</td>
<td>Controller</td>
<td>Unrealized</td>
<td>100</td>
</tr>
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<td>javax.media</td>
<td>Time</td>
<td>ONE_SECOND</td>
<td>10000000000</td>
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<tr>
<td>javax.media.protocol</td>
<td>Positionable</td>
<td>RoundDown</td>
<td>2</td>
</tr>
<tr>
<td>javax.media.protocol</td>
<td>Positionable</td>
<td>RoundNearest</td>
<td>3</td>
</tr>
<tr>
<td>javax.media.protocol</td>
<td>Positionable</td>
<td>RoundUp</td>
<td>1</td>
</tr>
<tr>
<td>javax.media.protocol</td>
<td>SourceStream</td>
<td>LENGTH_UNKNOWN</td>
<td>-1</td>
</tr>
</tbody>
</table>
ANNEX C. JAVA SYSTEM PROPERTIES

The entirety of this annex is normative.

This annex specifies the values of certain Java system properties which are accessible by means of System.getProperty(java.lang.String) and related methods. A procedural application environment shall use the values defined below except where marked implementation specific in which case an implementation specified value shall be used. Access to read these properties shall not be denied to any application.

Other than the properties listed below, system properties that begin with "dase" or "org.atsc" are reserved for future use and shall not be used by an application entity or procedural application environment.

Table 12 Java System Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;dase.delivery.system&quot;</td>
<td>&quot;ARM&quot;</td>
</tr>
<tr>
<td>&quot;dase.implementation.name&quot;</td>
<td>implementation specific</td>
</tr>
<tr>
<td>&quot;dase.implementation.vendor&quot;</td>
<td>implementation specific</td>
</tr>
<tr>
<td>&quot;dase.implementation.version&quot;</td>
<td>implementation specific</td>
</tr>
<tr>
<td>&quot;dase.implementation.level&quot;</td>
<td>&quot;1&quot;</td>
</tr>
<tr>
<td>&quot;dase.specification.name&quot;</td>
<td>&quot;DASE-1&quot;</td>
</tr>
<tr>
<td>&quot;dase.specification.vendor&quot;</td>
<td>&quot;ATSC&quot;</td>
</tr>
<tr>
<td>&quot;dase.specification.version&quot;</td>
<td>&quot;1.0&quot;</td>
</tr>
<tr>
<td>&quot;file.separator&quot;</td>
<td>implementation specific</td>
</tr>
<tr>
<td>&quot;line.separator&quot;</td>
<td>implementation specific</td>
</tr>
<tr>
<td>&quot;path.separator&quot;</td>
<td>implementation specific</td>
</tr>
<tr>
<td>&quot;user.language&quot;</td>
<td>user specified language identifier</td>
</tr>
<tr>
<td>&quot;user.region&quot;</td>
<td>user specified region identifier</td>
</tr>
<tr>
<td>&quot;user.timezone&quot;</td>
<td>user specified timezone identifier</td>
</tr>
</tbody>
</table>

Notes

1. It is recommended that the value of the "file.separator" system property be "/".
2. It is recommended that the value of the "line.separator" system property be "\n".
3. It is recommended that the value of the "path.separator" system property be ";".
4. The value of the "user.language" system property shall either be an empty string or be consistent with the syntax of the language identifier as returned by java.util.Locale.getLanguage(). The actual value should be specified or specifiable by the end-user in an implementation specific fashion.
5. The value of the "user.region" system property shall either be an empty string or be consistent with the syntax of a string composed of a country identifier as returned by java.util.Locale.getCountry() followed optionally by '_' (underscore) and a variant identifier as returned by java.util.Locale.getVariant(). The actual value should be specified or specifiable by the end-user in an implementation specific fashion.
6. The value of the "user.timezone" system property shall be consistent with the syntax of the timezone identifier as returned by java.util.TimeZone.getID(). The actual value should be specified or specifiable by the end-user in an implementation specific fashion.
ANNEX D.  XLET CONTEXT PROPERTIES

The entirety of this annex is normative.

This annex specifies all standard, pre-defined properties which are accessible by means of
javax.tv.xlet.XletContext.getXletProperty().

Other than the properties listed below, Xlet context properties which begin with "dase" or
"org.atsc" are reserved for future use and shall not be used by an application entity or
procedural application environment.

Table 13 Xlet Context Properties

<table>
<thead>
<tr>
<th>Property Key</th>
<th>Value Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;javax.tv.xlet.args&quot;</td>
<td>java.lang.String[]</td>
</tr>
<tr>
<td>&quot;org.atsc.trigger.source.default&quot;</td>
<td>org.atsc.trigger.TriggerSource</td>
</tr>
<tr>
<td>&quot;org.atsc.util.locales&quot;</td>
<td>java.util.Locale[]</td>
</tr>
<tr>
<td>&quot;org.atsc.xlet.obj.codebase&quot;</td>
<td>java.lang.String or null</td>
</tr>
<tr>
<td>&quot;org.atsc.xlet.obj.data&quot;</td>
<td>java.lang.String or null</td>
</tr>
<tr>
<td>&quot;org.atsc.xlet.obj.type&quot;</td>
<td>java.lang.String or null</td>
</tr>
</tbody>
</table>

The determination of the values of these properties is described in the following sub-
sections.

D.1  javax.tv.xlet.args

The value of the Xlet context property javax.tv.xlet.args shall be a String array whose
entries are determined as follows:

(1)  for a primary Xlet, use the values of the arg.n application parameters specified by the
application's metadata resource in accordance with [DASE], Section 6.1.1.13.1;
(2)  for a secondary Xlet, use the value of the args parameter provided to the
org.atsc.xlet.XletRegistry.startXlet(...) method;
(3)  for an embedded Xlet, use the values of the arg.n parameters specified by param
element children of the object element in accordance with DASE-1 Part 2: Declarative
Applications and Environment, Section 5.1.1.6.8.

Note: See Section 3.3 for definitions of primary, secondary, and embedded Xlets.

D.2  org.atsc.trigger.source.default

The value of the Xlet context property org.atsc.trigger.source.default shall be
determined as follows:

(1)  for each Xlet, create and use an instance of org.atsc.trigger.TriggerSource.

    Note: The use of distinct instances of TriggerSource for distinct Xlets is not intended to
    imply the presence of multiple broadcast trigger sources; that is, a single broadcast trigger
    source whose target is a single DASE application results in dispatching each
    TriggerEvent to each TriggerListener registered with each TriggerSource
    instance associated with the single broadcast trigger source.

D.3  org.atsc.util.locales

The value of the Xlet context property org.atsc.util.locales shall be an array of
java.util.Locale objects where each object is a cloned copy of the java.util.Locale object
representing a supported locale.
Note: The value of this Xlet context property is equivalent to that returned by the java.util.Locale.getAvailableLocales() method defined by [JDK1.2.2] but not supported by [PJAE].

D.4 org.atsc.xlet.obj.codebase

The value of the Xlet context property org.atsc.xlet.obj.codebase shall be determined as follows:

1. for an embedded Xlet, use the absolutilzied form of the URI value of the object element’s codebase attribute, if specified, or an empty string, if not specified;
2. otherwise, use the value null.

D.5 org.atsc.xlet.obj.data

The value of the Xlet context property org.atsc.xlet.obj.data shall be determined as follows:

1. for an embedded Xlet, use the absolutilzied form of the URI value of the object element’s data attribute, if specified, or an empty string, if not specified;
2. otherwise, use the value null.

D.6 org.atsc.xlet.obj.type

The value of the Xlet context property org.atsc.xlet.obj.type shall be determined as follows:

1. for an embedded Xlet, use the value of the object element’s type attribute, if specified, or an empty string, if not specified;
2. otherwise, use the value null;
ANNEX E. INTERNATIONAL RESOURCES

The entirety of this annex and its subsections is normative.

This annex specifies certain resources required to support Java localization and internationalization features.

E.1 External Character Encodings

A procedural application environment shall support the following external character encoding systems. These systems shall be supported by all Java methods which take a character encoding system name as an argument; e.g., String(byte[], int, int, String) and String.getBytes(String). A procedural application environment should use [UTF-8] as the default platform character encoding system.

Table 14 External Character Encodings

<table>
<thead>
<tr>
<th>Character Encoding Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;UTF-8&quot;</td>
<td>UCS Transformation Format, 8-bit Form</td>
</tr>
<tr>
<td>&quot;ISO-8859-1&quot;</td>
<td>ISO Latin 1</td>
</tr>
</tbody>
</table>

E.2 Built-In Locales

A procedural application environment shall support all necessary resources required to implement the semantics of the following locales:

Table 15 Built-In Locales

<table>
<thead>
<tr>
<th>Locale Name</th>
<th>Predefined Locale Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;en&quot;</td>
<td>Locale.ENGLISH</td>
<td>English, Generic</td>
</tr>
<tr>
<td>&quot;en_US&quot;</td>
<td>Locale.US</td>
<td>English, United States</td>
</tr>
<tr>
<td>&quot;en_CA&quot;</td>
<td>Locale.CANADA</td>
<td>English, Canada</td>
</tr>
<tr>
<td>&quot;fr&quot;</td>
<td>Locale.FRENCH</td>
<td>French, Generic</td>
</tr>
<tr>
<td>&quot;fr_CA&quot;</td>
<td>Locale.CANADA_FRENCH</td>
<td>French, Canada</td>
</tr>
<tr>
<td>&quot;es&quot;</td>
<td>none</td>
<td>Spanish, Generic</td>
</tr>
<tr>
<td>&quot;es_MX&quot;</td>
<td>none</td>
<td>Spanish, Mexico</td>
</tr>
</tbody>
</table>
Changes
The entirety of this section is informative.

Changes from Candidate Standard to Standard
The following table enumerates the changes between the issuance of the candidate standard edition of this specification and the standard edition.

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Change status to standard.</td>
</tr>
<tr>
<td>2</td>
<td>Change [JAR-MANIFEST] to [JAR]; update name and hyperlink.</td>
</tr>
<tr>
<td>2</td>
<td>Add [JDK1.1.8] and [JDK1.2.2] normative references.</td>
</tr>
<tr>
<td>3</td>
<td>Add JDK acronym.</td>
</tr>
<tr>
<td>4.5</td>
<td>Clarify relative file name resolution for application delivery file systems.</td>
</tr>
<tr>
<td>5.1</td>
<td>Clarify role and value of class name extension.</td>
</tr>
<tr>
<td>5.1</td>
<td>Clarify requirements for default constructors.</td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.AWTEventMulticaster.save(ObjectOutputStream,String)</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.AWTEventMulticaster.saveInternal(ObjectOutputStream,String)</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Specify values of java.awt.Color constants.</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayoutInfo.</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.MenuContainer.</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Component to implement MenuContainer, but do require getFont().</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Component.list().</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Component.list(PrintStream).</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Component.list(PrintStream,int).</td>
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</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Component.list(PrintWriter).</td>
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</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Component.list(PrintWriter,int).</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Component.paramString().</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Recommend UnsupportedOperationException if setCursor() semantics aren't supported.</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Container.add(String,Component).</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Container.addImpl(Component,Object,int).</td>
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<tr>
<td>5.1.1.2.1 Don't require java.awt.Container.list(PrintStream,int).</td>
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<td>5.1.1.2.1 Don't require java.awt.Container.list(PrintWriter,int).</td>
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<tr>
<td>5.1.1.2.1 Don't require java.awt.Container.printlnComponents(Graphics).</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Recommend java.awt.Dimension.hashCode().</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Clarify semantics of java.awt.FontMetrics.bytesWidth(byte[],int,int).</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Clarify semantics of java.awt.Graphics.drawBytes(byte[],int,int,int,int).</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout comptable.</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout.defaultConstraints.</td>
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</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout.layoutInfo.</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout.MAXGRIDSIZE.</td>
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</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout.MINSIZE.</td>
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</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout.PREFERREDSIZE</td>
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</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout.AdjustForGravity(GridBagConstraints,Rectangle).</td>
<td></td>
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<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout ArrangeGrid(Container).</td>
<td></td>
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<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout.GetLayoutInfo(Container,int).</td>
<td></td>
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<tr>
<td>5.1.1.2.1 Don't require java.awt.GridBagLayout.GetMinSize(Container,GridBagLayoutInfo).</td>
<td></td>
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<tr>
<td>5.1.1.2.1 Clarify semantics of java.awt.Image.getProperty(String); specify pre-defined image properties.</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Recommend java.awt.Insets.hashCode().</td>
<td></td>
</tr>
<tr>
<td>5.1.1.2.1 Don't require java.awt.Toolkit.getNativeContainer(Container).</td>
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<tr>
<td>Section</td>
<td>Description</td>
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<td>---------</td>
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<tr>
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<td>Don't require java.awt.Toolkit.getSystemEventQueue().</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Don't require java.awt.Toolkit.getSystemEventQueueImpl().</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Clarify semantics of java.awt.Toolkit.createImage(byte[]).</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Clarify semantics of java.awt.Toolkit.getProperty(String,String).</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Don't require java.awt.event.KeyEvent(Component,int,long,int,int).</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Clarify semantics of java.awt.event.KeyEvent.isAction().</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Don't require java.awt.image.ColorModel.finalize().</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Clarify semantics of java.awt.image.CropImageFilter.setProperties(Hashtable).</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Clarify semantics of java.awt.image.DirectColorModel.getRGB().</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Clarify semantics of java.awt.image.ImageFilter methods reserved for use by image producer.</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Clarify semantics of java.awt.image.ImageFilter.setProperties(Hashtable).</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Don't require java.awt.image.PixelGrabber.status().</td>
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<tr>
<td>5.1.1.2.1</td>
<td>Clarify semantics of java.awt.image.ReplicateScaleFilter.setProperties(Hashtable).</td>
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<td>Don't require java.beans.BeanDescriptor.</td>
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<td>Don't require java.beans.BeanInfo.</td>
</tr>
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<td>Don't require java.beans.EventSetDescriptor.</td>
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<td>Don't require java.beans.FeatureDescriptor.</td>
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<td>Don't require java.beans.IndexedPropertyDescriptor.</td>
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<td>Don't require java.beans.IntrospectionException.</td>
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<td>Don't require java.beans.MethodDescriptor.</td>
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<td>Don't require java.beans.SimpleBeanInfo.</td>
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<tr>
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<td>Don't require java.beans.Beans.getInstanceOf(Object,Class).</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Don't require java.beans.Beans.isInstanceOf(Object,Class).</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Don't require java.beans.Beans.setDesignTime(boolean).</td>
</tr>
<tr>
<td>5.1.1.2.1</td>
<td>Don't require java.beans.Beans.setGuiAvailable(boolean).</td>
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