

Introduction to ACAP

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Outline

- ▣ Specification Genesis
- ▣ Content Model
- ▣ System Model
- ▣ Transport Model
- ▣ ACAP vs DASE - Differences
- ▣ Conclusions

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What and Why?

- What is ACAP?
 - Advanced Common Application Platform
- Why ACAP?
 - Harmonize MHP, OCAP, and DASE
 - Common Terrestrial, Cable, Satellite Middleware

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Basic Terminology

- What is ACAP-J?
 - ACAP Java Applications and Environment
- What is ACAP-X?
 - ACAP XHTML Applications and Environment
- What is ACAP-C?
 - ACAP Cable Subsystem

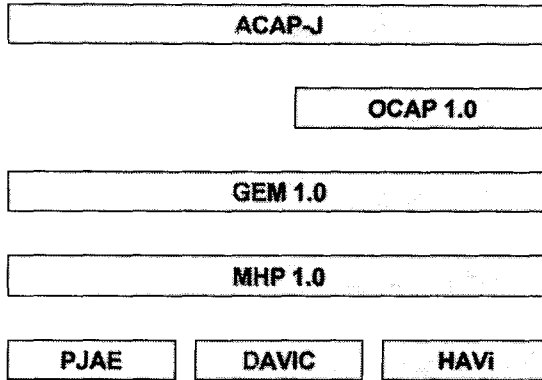
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ACAP-J Genesis

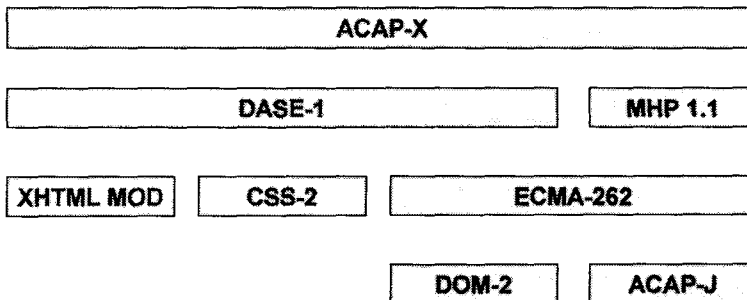


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ACAP-X Genesis

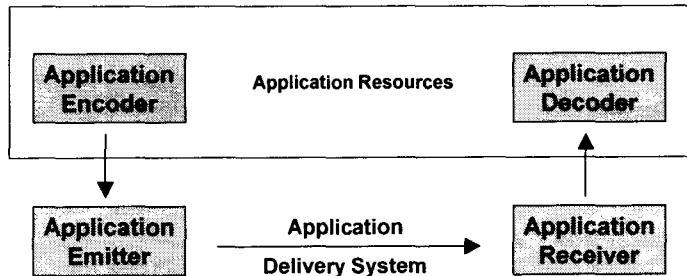


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Layered Architecture



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ACAP Multimedia Content

- ACAP-J Application (Procedural)
 - JavaTV Xlet(s)
- ACAP-X Application (Declarative)
 - XHTML/CSS/DOM
- Hybrid Applications
 - ACAP-X with Embedded Xlet(s)
 - ACAP-X with Inter-Environment API Bridge

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ACAP Monomedia Content

- Graphics
 - JPEG, PNG
 - MNG (ACAP-X only)
- Streaming Video/Audio
 - MPEG-2 Transport Stream
 - MPEG-2 Video ES, AC-3 Audio ES
- Non-Streaming Video/Audio
 - MPEG-2 Video “Drip” Format
 - MPEG-1 Audio Layers 1 and 2
 - audio/basic

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ACAP Other Content

- Outline/Bitmap Font
 - TrueDoc (PFR)
- Triggers
- Archives
 - ZIP
- Security Metadata
 - Permission Requests
 - Digests, Signatures, Certificates
- Application Metadata

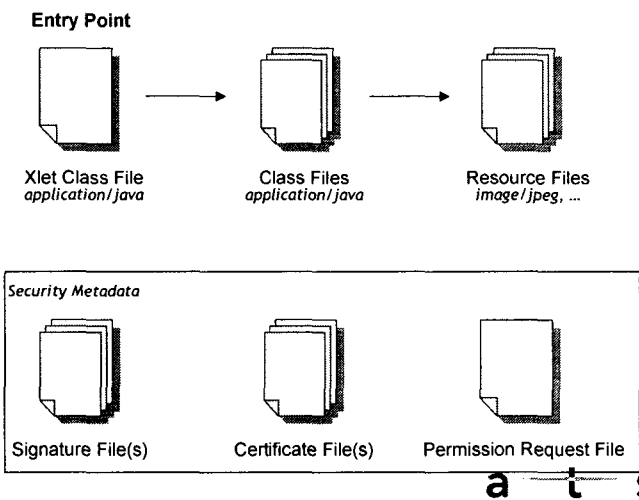
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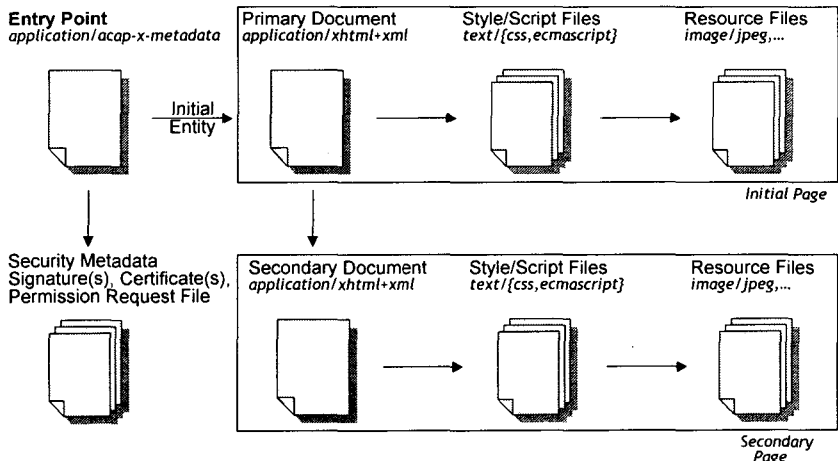
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ACAP-J Application Structure



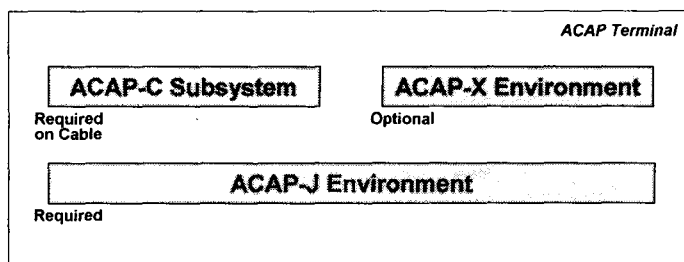
ACAP-X Application Structure



Application Modes

- ▣ Service Bound Application
 - ▣ Bound to service (virtual channel)
- ▣ Shared Application
 - ▣ As service bound, but multiple services
- ▣ Unbound Application
 - ▣ Persists across power-off; not service bound

ACAP System



ACAP-J Environment

Java Byte Code
Interpreter or Compiler

Personal Java, JMF, JavaTV, HAVI UI, DAVIC, DVB, ATSC, OCAP
API Implementation

Built-In JMF
Media Players and Data Sources

Common Content Decoders
(JPEG, PNG, TrusDoc, ...)

Application Resource
Cache and Request Manager

Security and
Platform Abstraction Layer

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ACAP-X Environment

XHTML
Interpreter

Cascading Style Sheet
Interpreter

ECMAScript
Interpreter

Document and Environment Object Model
API Implementation

Content
Layout and Format

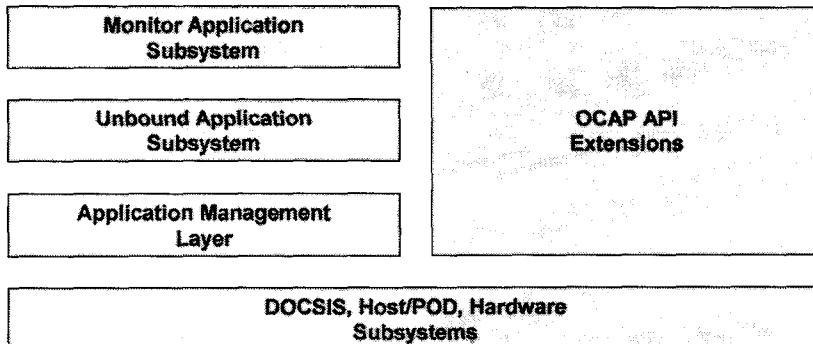
Common Content Decoders
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Application Resource
Cache and Request Manager

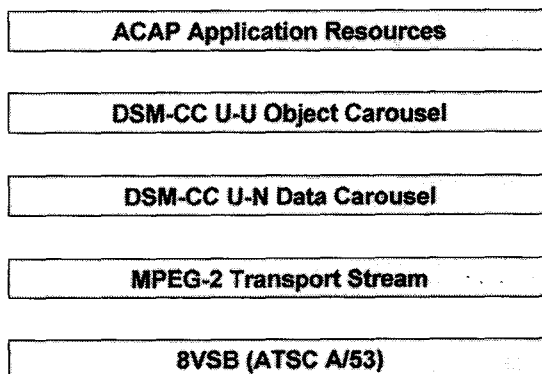
Security and
Platform Abstraction Layer

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ACAP-C Subsystem



ACAP Terrestrial Delivery



ACAP Cable Delivery

ACAP Application Resources

DSM-CC U-U Object Carousel

DSM-CC U-N Data Carousel

MPEG-2 Transport Stream

64/256QAM (SCTE 40)

ACAP Interactive Delivery

ACAP Application Resources

DSM-CC U-U Object Carousel

DSM-CC U-N Download Protocol

MPEG-2 Transport Stream

8VSB or 64/256QAM



HTTP

TCP

IP

DOCSIS/OOB/POTS

Differences from DASE

- ▣ Application and Environment Differences
- ▣ Security Differences
- ▣ Transport and Signaling Differences
- ▣ Interaction Channel Differences
- ▣ Conformance Differences

Application Content Differences

- ▣ Application Models
 - ▣ Addition of unbound applications (ACAP-C)
- ▣ Add Monomedia Content Types
 - ▣ audio/mpeg, image/mpeg, video/dvb.mpeg.drip
- ▣ Remove Monomedia Content Types
 - ▣ video/mng not supported in ACAP-J only profile

Application Packaging Differences

- ACAP-J Only Profile
 - No support for archive (e.g., ZIP) packaging; must use individual OC file objects
- ACAP-J Applications
 - No application metadata resource; AIT only
- ACAP-X Applications
 - Application metadata resource optional

URI Scheme Differences

- Add “acap:”
 - Based on “dvb:” and “ocap:”
 - Replaces “lid:” and “tv:” functionality, which have been removed
- Add “exit:” for ACAP-X usage only
- Remove “ecmascript:” due to removal of DDE-1 (SMPE 363M) legacy support
- Use of “archive:” limited to ACAP-X

ACAP-J Differences – APIs #1

- Remove org.atsc APIs
- Remove org.w3c APIs
- Add org.dvb APIs
- Add org.davic APIs
- Add org.ocap APIs for ACAP-C (optional)

ACAP-J Differences – APIs #2

- Add org.atsc.dom APIs as optional feature, required only if ACAP-X profile supported
- Add org.w3c.dom APIs as optional feature, required only if ACAP-X profile supported
 - Subset org.w3c.dom.css
- Add new org.atsc.si APIs
 - ContentIdentification, ContentIdentifications
 - ISANIdentification, VISANIdentification

ACAP-X Differences – XHTML #1

- Change of Primary XDML FPI
 - `--/ATSC//DTD XHTML ACAP-X XDML 1.0//EN`
- Remove XHTML intrinsic events
- Add ACAP specific event attributes
 - `acap:onload`, `acap:onunload`, `acap:ondomstable`
- Remove DDE-1 only support
 - legacy use of “name” attribute removed
 - trigger object usage removed

ACAP-X Differences – XHTML #2

- Forward Compatibility Support
 - ACAP-X Family Document Type
 - `--/ATSC//DTD XHTML ACAP-X XDML X.Y//EN`
 - `--/ORG//DTD XHTML ACAP-X XDML X.Y PropNameVersion//EN`
 - `--/W3C//DTD XHTML Basic 1.0//EN`
- Application Launching, Replacement
- Service and Service Component Selection

ACAP-X Differences – CSS

- Media Type Support
 - Remove @media atsc
 - Add @media tv
- Style Properties
 - Change atsc-nav-* to nav-*; atsc-rgba() to rgba()
 - Add crop and opacity properties
- Add @viewport rule
 - initial-container, region, resolution descriptors

ACAP-X Differences – DOM #1

- Remove DDE-1 Support
 - HTMLDocument::write(), writeln()
 - HTML{Image,Object}ElementExt::lowsrc
 - HTMLFormElementExt
 - HTMLTriggerObjectElementExt
 - Navigator::dde*

ACAP-X Differences – DOM #2

- Subset StyleSheet and CSS DOM APIs
 - Remove all APIs except for:
 - CSSStyleDeclaration
 - ElementCSSInlineStyle
 - CSSStyleDeclaration::getPropertyCSSValue
 - Raise exception if invoked

ACAP-X Differences – DOM #3

- Add Event APIs
 - ApplicationEvent
 - TimerEvent
 - TriggerEvent
- Add TimerDispatcher on Window Object
 - startTimer, cancelTimer

ACAP-X Differences – DOM #4

- ⌘ Add Document/Lifecycle Event Types
 - ⌘ org.atsc.document.domstable
 - ⌘ org.atsc.application.started
 - ⌘ org.atsc.application.suspending
 - ⌘ org.atsc.application.resumed
 - ⌘ org.atsc.application.terminating

ACAP-X Differences – DOM #5

- ⌘ Other New Event Types
 - ⌘ org.atsc.timer
 - ⌘ org.atsc.trigger
 - ⌘ generic trigger event
 - ⌘ application defined trigger event types
 - ⌘ requires prefix that is not org.atsc.trigger

ACAP-X Differences – Bridge

- Inter-Environment Bridge
- ECMAScript ↔ Java
- Based on MHP1.1 API Bridge
 - Concept from Netscape's LiveConnect
- Provides access to ACAP-J APIs independently from embedded Xlets
- Requires granting of `acap:bridge` permission to access bridge

ACAP-X Differences – Triggers

- Drop support of “script” trigger
- Introduce environment triggers
 - `org.atsc.trigger.start`
 - used with PREFETCH applications
- Introduce application triggers
 - event type is application specific; must not start with “org.atsc.trigger”
- Both asynchronous and synchronized triggers
 - Synchronized triggers based on NPT timeline
 - Optional binary payload

Security Differences – Trust

- Terrestrial Transport
 - considered trusted by default
- Cable Transport
 - considered untrusted by default
 - must be verifiably signed to be trusted
- Only trusted applications can be granted access to privileged operations

Security Differences - Permissions

- New Permission Request File DTD
 - Adds ocap and acap specific permission requests
 - acap:cookie
 - acap:rce
 - acap:bridge
 - Xlet embedding now granted by default

Transport Differences – Announcement

- ACAP announcement not presently supported by A/65 or SCTE 65
- Subject to future development in ATSC and SCTE

Transport Differences – Signaling

- Drop use of A/90 SDF
- Introduce use of MHP based AIT
- AIT delivered as sub-tables in PSI sections
- PMT signals presence of AIT and OC

Transport Differences – Encapsulations

- Bounded resources (files) encapsulated as BIOP::File in DSM-CC U-U Object Carousel (OC)
- Resource directories encapsulated as BIOP::Directory in DSM-CC U-U OC
- Stream (async or sync) not supported

Transport Differences – Object Carousel

- Based on MHP1.0.3 Annex B
- Adds timestamp descriptor for providing last modification time
- Adds HTTP{S}ProfileBody IOR form
 - Permits access to resources by http: and https:
 - Required only with ACAP-X profile

Transport Differences – Triggers

- Drops use of A/93
- Introduces use of BIOP::StreamEvent as defined by MHP1.0.3 Annex B
- Supports both asynchronous (“do-it-now”) and synchronized trigger events
- Some technical issues with synchronized triggers remain to be resolved

Interaction Channel Differences

- DASE-1 did not include IC support
- ACAP-J and ACAP-X support
 - IP, ICMP, UDP, TCP, TLS
- ACAP-X adds support for HTTP 1.1
- Privileged operation to perform explicit API access

Conformance Differences

- ⌘ Requires GEM 1.0 Compliance
- ⌘ ACAP system must support one of two profiles:
 - ⌘ ACAP-J Only
 - ⌘ ACAP-J and ACAP-X
- ⌘ ACAP-C Subsystem required on Cable

Conclusions

- ⌘ ACAP not backward compatible with DASE
 - ⌘ But is functional superset of DASE
- ⌘ ACAP not backward compatible with A/9X
 - ⌘ But can co-exist with A/9X transport
- ⌘ ACAP compatible with GEM
 - ⌘ Provides basis for global interoperability of Java TV apps
- ⌘ ACAP compatible with OCAP 1.0
 - ⌘ Requires Optional ACAP-C Subsystem