

2 Digital Rights Management

- 2.1 Media Rights
- 2.2 Rights Models
- 2.3 Principles of DRM Systems
- 2.4 DRM Standards
- 2.5 Selected Commercial Solutions

Literature:

Bill Rosenblatt, Bill Trippe, Stephen Mooney: Digital Rights Management – Business and Technology, M&T Books 2002

Gerald Fränkl, Philipp Karpf: Digital Rights Management Systeme – Einführung, Technologien, Recht, Ökonomie und Marktanalyse, pg-Verlag 2004

Urheberrecht (Intellectual Property Right IPR)

- Geschichte:
 - “Geistiges Eigentum” in Antike und Mittelalter unbekannt
 - Autorenprivilegien (seit 1486) (Buchdruck 1440)
 - Theorie vom geistigen Eigentum seit ca. 1700
- Aufgaben des Urheberrechts:
 - Sicherung von Nutzungs-, Veröffentlichungs- und Verwertungsrechten für den Urheber eines Werkes
 - Rechte bestehen direkt und registrierungsunabhängig
 - » Anders als z.B. bei Patenten und Markennamen
- Territorialprinzip
 - Regionale Gesetze
 - Wenige internationale Abkommen
 - » WIPO = World Intellectual Property Organisation (www.wipo.int)
 - » 150 Teilnehmerstaaten

Types of Copyrighted Works

- Literary works, e.g. newspapers, manuals, fiction, non-fiction, poetry, advertisements, ...
- Musical works, such as songs and instrumentals
- Dramatic works, such as plays
- Pantomime and choreographic works, such as dance and mime
- Pictorial, graphic and sculptural works, such as photographs, paintings, maps, drawings, ...
- Motion pictures and other audiovisual works
- Sound recordings
- Architectural works
- Audio-visual displays
- Software programs

IPR in the U.S. (1)

- Article 1, section 8 of U.S. Constitution:
 - “The Congress shall have Power [...] to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”
- Copyright Act of U.S. Congress 1976
 - Protects “...original works of authorship fixed in a tangible medium of expression, now known or later developed, from which they can be perceived, reproduced and otherwise communicated, either directly or with the aid of a machine or device”
 - **Fair-Use** Doctrine
 - Use of the copyrighted work to a small extent which does not affect the market value of the work is admitted
 - **First-Sale** Doctrine
 - Buyers get extensive rights to do everything they want with the physical copy bought, but they do not get the copyright for the content
 - **Public-Domain** Doctrine
 - Works older than 70 years are free of copyright

IPR in the U.S. (2)

- Digital Millennium Copyright Act (DMCA) 1998
 - US response to world-wide copyright treaties (WIPO Copyright Treaty and WIPO Performances and Phonograms Treaty)
 - Section 1201: **Anti-circumvention provision:**
 - It is prohibited to make or sell devices that
 - » Are primarily designed or produced to circumvent technological measures to protect copyrights
 - » Have only limited commercial significant purpose or use other than this kind of circumvention
 - » Are marketed for such circumvention
 - This is a tacit admission that copy-protection technologies will never be perfect!
 - Problematic:
 - » Where does fair use end? (e.g. circumvention for backup copies)
 - » Can DMCA restrict the right of free speech? (e.g. for magazines publicizing protection-cracking software code)

IPR in the EU

- Original Idea: Harmonization of the individual regulations of the EU member states
 - “Green Book” 1997
- Basis: Article 94 of EU Treaty
 - “Harmonization of national provisions affecting Common Market”
- EU entered WIPO in 2001
- EU Copyright Directive (Info-Richtlinie) 2001
 - Gives a similar basis for Digital Rights Management as the DMCA in the U.S.A.
 - Strong emphasis on the rights of the creator (*droit moral*), less market-oriented

Urheberrecht in Deutschland

- Urheberrechtsgesetz (UrhG) 1965
- Novelliert 2003 in Anpassung an die EU-Info-Richtlinie und die WIPO-Abkommen („Erster Korb“)
 - Künstlerische und ästhetische Interessen des Urhebers an seinem Werk (nur natürliche Personen, nicht wie in den USA auch juristische)
 - Anreiz für Urheber, weiter Werke herzustellen
 - Sicherung einer angemessenen Vergütung
 - Eigentümerstellung des Urhebers fast so stark wie bei einer materiellen Sache
- Zweierlei Rechte:
 - Urheber-Persönlichkeitsschutz
 - » Nicht veräußerlich (kann nicht verkauft, verschenkt, vererbt werden)
 - Verwertungsrechte
 - » Urheber bestimmt, ob Werk vervielfältigt werden darf
 - » Privatkopie (Vervielfältigung zum eigenen Gebrauch) immer erlaubt (§53)

Aktuelle Entwicklung im deutschen Urheberrecht

- Seit 2004 Planung einer weiteren Reform des UrhG („Zweiter Korb“)
 - Urheberrecht in Wissenschaft und Forschung:
 - » Relativ großzügige Regelung des §52a sollte Ende 2006 auslaufen, nun bis 2008 vorläufig verlängert
 - » §52b: Digitalisierte Bibliotheksbestände nur an Leseplätzen der Bibliothek nutzbar (Ausnahme: Explizit weitergehende Rechte erworben)
 - Privatkopie und Tausch:
 - » Privatkopie kopiergeschützter Materialien verboten
 - » Tausch von urheberrechtlich geschützten Inhalten über Netzwerke verboten
 - » Pauschalvergütung für Privatkopien (z.B. Geräteabgabe) abhängig von der Verbreitung von Digital Rights Management, sinkt mit höherem DRM-Einsatz
 - » Keine Bagatellklausel (Kabinettsbeschluss 22.3.2006): Auch Privatpersonen z.B. bei Nutzung von Tauschbörsen prinzipiell mit bis zu drei Jahren Haft bedroht

Rights Management Terminology

- *Rightsholder*: A party owning rights in intellectual property
- *User*: A party that intends to make use of intellectual property rights. May be a *licensee* or a *buyer* (or *grantee*).
- *Content owner*: Like rightsholder, but less strict. May own the rights only partially, e.g. only for specific countries.
- *Rights transaction*: Transaction establishing a new rights situation
 - Example: Buying a newspaper, buying the right to re-publish content from the newspaper, buying the publishing house
- *Agent*: A legal entity authorized by a rightsholder to enter into a rights transaction on behalf of the rightsholder
- *Royalties*: Monetary compensation to a rightsholder or his agent for the use of intellectual property rights
- *Rights management*: Business processes that for legal and commercial purposes track rights, rightsholders, licenses, sales, royalties, and associated terms and conditions
- *Digital rights management (DRM)*: Rights management using digital technology

Traditional Rights Management Solutions (1)

- The solution found for photocopying: *Copyright Clearance Center*
 - Obtains the rights from publishers to make photocopies (relating to over 1.75 million works)
 - » US: Copyright Clearance Center (CCC), www.copyright.com
 - » Germany: VG WORT (Verwertungsgemeinschaft Wort, www.vgwort.de)
 - 2005: Income 91 Mio EUR, 84 Mio. EUR distributed to 325000 authors
 - » International Federation of Reproduction Rights Organizations (IFRRO)
 - Bundles these rights into an offer to users like copy centers
 - Publicly available photocopy machines can obtain a licence from CCC
 - » Similar system in Germany
 - Corporate organizations are charged according to survey data for a given industry branch
 - Recent development: Individual “Pay-per-use” via Internet
- Rather successful, low overhead
- Not the only possibility for rights transactions of this kind
 - Separate agreements with publishers always possible

Traditional Rights Management Solutions (2)

- Collective music licensing
- Organizations for collecting fees from commercial music use
 - U.S.: American Society of Composers, Authors and Publishers (ASCAP, www.ascap.com), Broadcast Music International (BMI, www.bmi.com)
 - Germany: “Gesellschaft für musikalische Aufführungs- und mechanische Vervielfältigungsrechte” (GEMA, www.gema.de)
- Music is played commercially at a high number of occasions:
 - Radio broadcasting, concerts, restaurants, shops, airlines, soundtracks for movie broadcasts, sound on websites, hold music for telephones, ...
 - This use is not covered by the license obtained with e.g. a CD
 - Additional fees are collected

Traditional Rights Management Solutions (3)

- In the schemes discussed above, the rightsholder is free to admit a certain use or not, depending on a rights transaction.
- *Compulsory licensing*:
 - Government-regulated pricing
 - As soon as user pays an established fee (possibly to a governmental organization), he has certain rights of use
 - Frequently used for patents the broad use of which is needed for the society welfare
 - » Compulsory licensing of “clean air” technologies
 - » Compulsory licensing of unique pharmaceutical products
 - » Sometimes also applied to media (e.g. for National Public Radio in US)
 - Pricing scheme is likely to be “flat”, e.g. monthly fee independent of actual degree of usage and used works

Background for Digital Rights Management?

- Position of the music and movie industry:
 - Each downloaded file is equal to lost sales income
 - IFPI Germany press release 21.3.2002: “Mass music copying and music piracy in the Internet threatens music markets”
 - » 11% drop of German music CD sales in 2002 compared to 2001 (ifpi.de)
 - » 6.7% drop of German music CD sales in 2005 compared to 2004
 - » 19% drop of worldwide CD sales between 2001 and 2005 (last two data: IFPI as cited in fin24.co.za)
 - Consequence: Sharing and copying seen as evil
- Independent positions:
 - The process of finding new music is closely coupled with sharing and copying (it is a social activity)
 - Sharing often leads to later purchase of physical copies (CD)
 - See eg. Singh et al.: Downloading vs. Purchase, DRMTICS 2005 Conference
- Parallel development:
 - Revenues from digital sales over Internet have almost tripled in 2005
 - » 2004: US\$ 400 m; 2005: US\$ 1.1 bn

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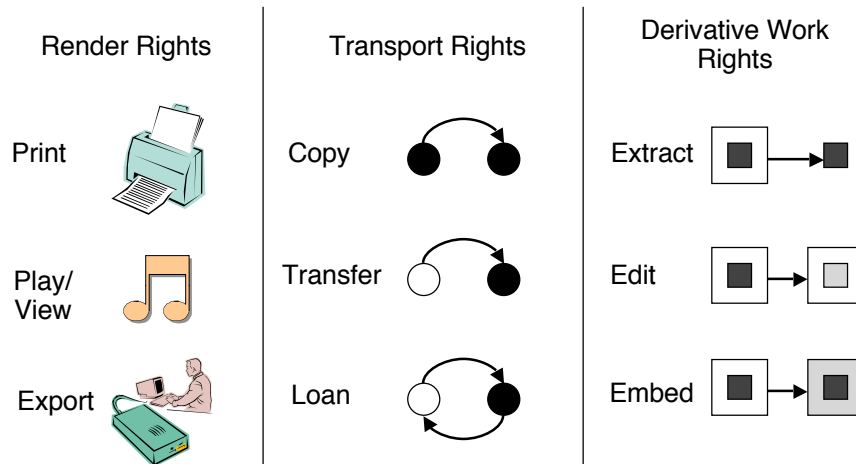
Gerald Fränkl, Philipp Karpf: Digital Rights Management Systeme – Einführung, Technologien, Recht, Ökonomie und Marktanalyse, pg-Verlag 2004

Examples for Content Rights Transactions

- Buying a book, the buyer gets:
 - The right to read one copy of the physical book arbitrarily often
 - The right to sell or give the book to someone else
 - He does *not* get the rights to, e.g.:
 - » To perceive the book in a different technology (eBook, audio book)
 - » To quote from the book in own publications beyond fair use
- Buying a cinema ticket, the buyer gets:
 - The right to see the movie once (or sometimes until the theatre closes)
 - He does *not* get the rights to, e.g.:
 - » Let a friend see the movie
 - » Make a video record of the movie
- Listening to a song on the radio, the listener gets (without paying)
 - The right to listen to the song
 - The right to record it for personal use

Fundamental Types of Rights

- According to Mark Stefik, Xerox PARC (“Letting Loose the Light”)

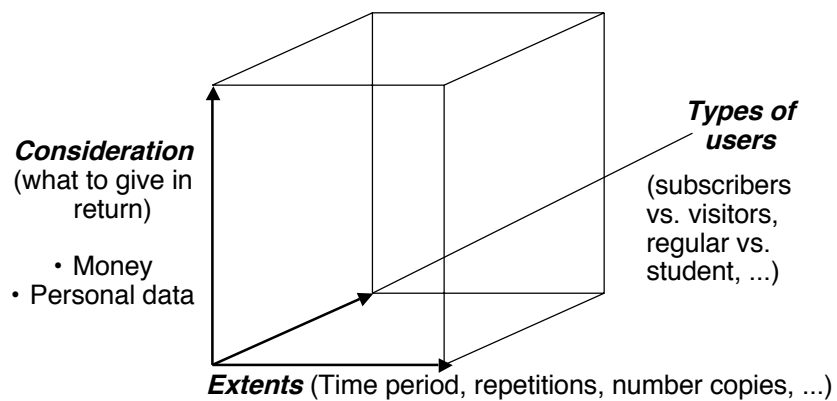


Utility Rights

- Additional types of rights which exist for technological reasons rather than to support publishers' business models
- Backup rights:
 - Right to make a copy as a safety means against technical failure
- Caching rights:
 - Right to make temporary local copies to improve performance
- Data integrity rights:
 - Right to create redundant code information etc. to ensure that the data does not get corrupted

Rights Attributes

- Rights attributes are additional specifications added to each of the fundamental rights
- Rights model = fundamental rights + rights attributes



Examples (Basic Rights Language) (1)

- Buying a book:
 - **Render rights:** Print
 - » Consideration: Price of the book
 - » Extent: Forever, one copy only
 - » Type of user: No distinctions
 - **Transport rights:** Sell, give away, loan
 - » No restrictions
 - **Derivative rights:** None
- Buying a cinema ticket:
 - **Render rights:** Play
 - » Consideration: Price of movie ticket
 - » Extent: Once or rest of the day
 - » Type of user: Adult or child
 - **Transport rights:** None
 - **Derivative rights:** None

Examples (Basic Rights Language) (2)

- Listening to a song on the radio
 - **Render rights:** Play
 - » Consideration: None
 - » Extent: Once for each receiver
 - » Type of user: No distinction
 - **Transport rights:** Copy for personal use
 - » Consideration: Percentage of the cost of the recording media
 - » Extent: Personal use only
 - » Type of user: No distinction
 - **Derivative rights:** None

Rights Transactions May Change Rights

- Recording a tape from radio is a step in a chain of rights transactions
- After recording, the rights on the record change:
 - Extent of the render right is now “forever”
 - New derivative rights are added, e.g.:
 - **Derivative right:** Extract and embed rights for commercial use
 - » Consideration: None
 - » Extent: Only 30 seconds samples
 - » Type of user: Commercial

Rights Models and Digital Media

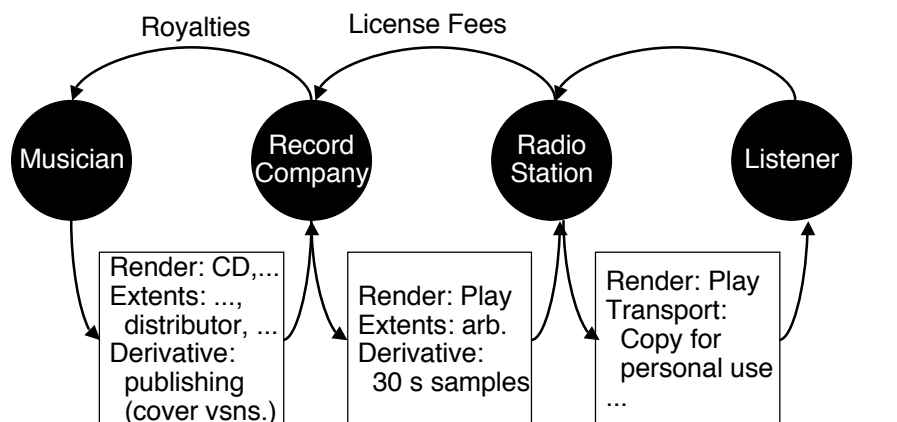
- Example: Music or video download service
 - **Render rights:** View
 - » Consideration: Price of the download
 - » Extent: Forever
 - » Type of user: No distinction
 - **Transport rights:** None
 - **Derivative rights:** None
- Practical questions:
 - How to ensure that the transport rights are obeyed (i.e. the file is not copied to other people)?
 - » Legal measures: How to prove from where the file came?
 - » Technical measures: How to make content viewable only for uniquely identified users?
 - These are technical challenges of DRM technology

Superdistribution

- Brad Cox: Superdistribution, *Wired Magazine*, Issue 2.09, Sep 1994 (www.wired.com)
- Basic idea (Ryoichi Mori): A software object cannot easily determine whether it has been copied or not, but it can easily be built to do some extra things when run.
- Superdistribution-enabled computer: Contains special (tamper-proof) hardware/software components for usage metering and transfer to some billing agency.
- Superdistribution-enabled software: Can be used only on superdistribution-enabled computers, and meters its use
 - Can be obtained and copied freely, since financial commitment is restricted to use, not to possession.
- Superdistribution-enabled content: Operating system automatically loads required playback software components
 - When content is played back, billing for content (and possibly playback software) takes place

Chains of Rights Transactions

- Rights transactions always take place in chains
- Each transaction creates a new set of rights
- Example:



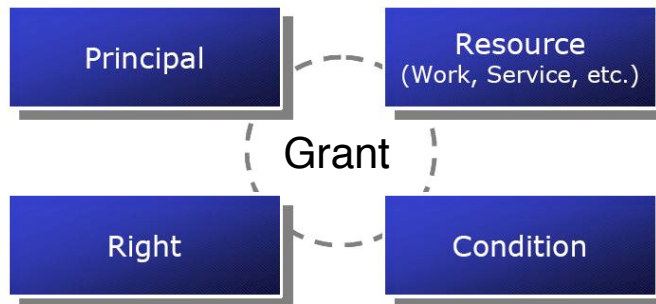
Superdistribution Chains

- Superdistribution can be used for managing distribution chains
 - Usage rights change during distribution (from business to business)
 - Idea: Copy freely, but keep always an adequate set of rights
- In a superdistribution scheme, one specifies
 - The rights for the object at hands
 - The rights that are *handed on* to others
- Transport rights extended with the specification of superdistribution rights
- Example: Buying and re-selling a book
 - **Render rights:** Print ...
 - **Superdistribution rights:**
 - » Render: Print
 - » Consideration: Half the selling price
 - » Extent: Up to 10 copies
 - » Type of user: No distinction

Implementing Rights Models

- Mark Stefik, Xerox Labs
 - “Letting Loose the Light: Igniting Commerce in Electronic Publication”, in: Internet Dreams - Archetypes, Myths and Metaphors, MIT Press 1996
 - Defined a complex *Digital Property Rights Definition Language (DPRL)*
 - » Lisp-like syntax
- ContentGuard (Xerox spin-off company, partially owned by Microsoft)
 - Transformed DPRL into XML syntax:
XrML (Extensible Rights Management Language)
 - » Current version: 2.0
 - » Submitted to OASIS for standardization
 - » ContentGuard holds key patents
 - www.xrml.org
- Impact of XrML:
 - Microsoft implements XrML in its Unified DRM solution
 - ISO standard MPEG-21 bases its “Rights expression language” (REL) on XrML
 - Open eBook Forum adopted MPEG-21 REL
- Two key questions, to be separated:
 - How to specify the rights which are adequate in a certain situation
 - How to enforce that the usage obeys the rights

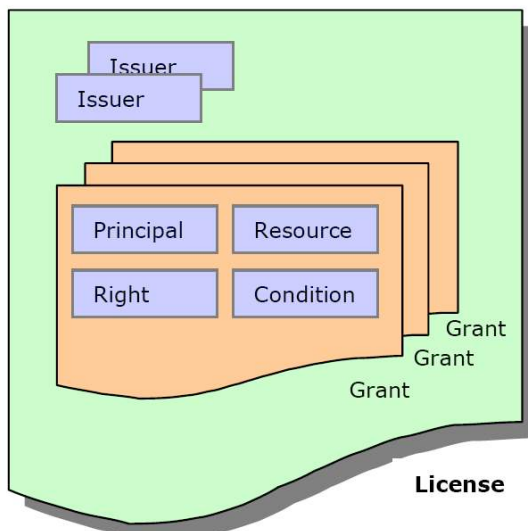
XrML Terminology: Grant



- Principal: Identification of a party to which rights are granted
- Right: A “verb” that the principal is granted to execute on a resource
- Resource: Object to which the grant refers (e.g. audio file or service)
- Condition: Specifies the terms under which the grant is valid

From XRML 2.0 Technical Overview

XrML Terminology: License



- *License* defines a set of grants
 - plus identification of issuer(s)
 - plus additional information like description, validity date, ...

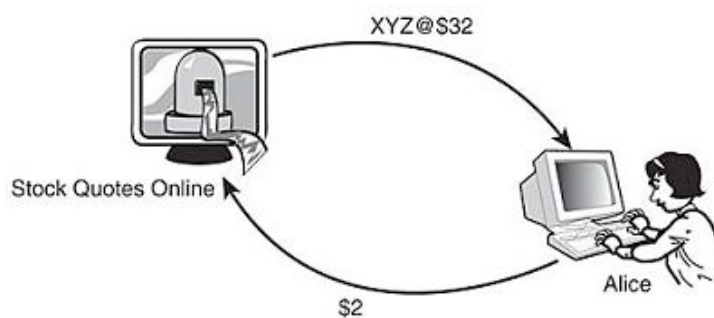
From XRML 2.0 Technical Overview

XrML Content Extension

- Specific XrML language elements for digital multimedia content
- Specific rights:
 - File Management Rights (accessFolderInfo, backup, delete, ...)
 - Render Rights (export, play, print)
 - Transport Rights (copy, loan, transfer)
 - Derivative Work Rights (edit, embed, extract)
 - Configuration Rights (install, uninstall)
- Specific resources:
 - DigitalWork
 - DigitalWorkMetadata
- Specific conditions:
 - Helper (software to exercise a right)
 - Renderer (device to render a work)
 - Watermark (information to be embedded)

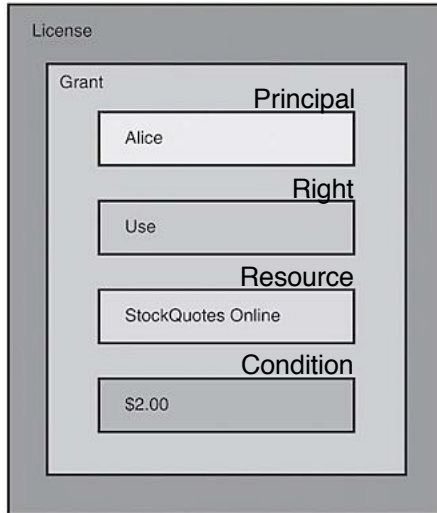
From XRML 2.0 Technical Overview

XrML Example (1)



- From: <http://www.devshed.com>
(Trust, Access Control, and Rights for Web Services, Part 2)

XrML Example (2)



```

<license>
  <grant>
    <keyHolder licensePartId="Alice">
      <info> digital signature </info>
    </keyHolder>

    <service:use/>

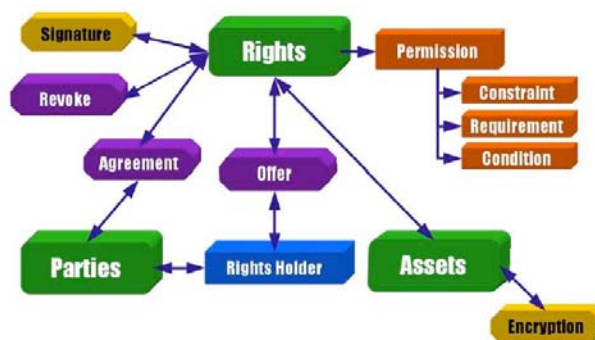
    <serviceReference>
      WSDL definition of
      StockQuotes Online
    </serviceReference>

    <sx:fee>
      <sx:paymentPerUse>
        <sx:rate>
          <sx:amount>2.00</sx:amount>
          <sx:currency>US</sx:currency>
        </sx:rate>
      </sx:paymentPerUse>
      <sx:to> payment info </sx:to>
    </sx:fee>
  </grant>
</license>

```

ODRL

- Open Digital Rights Language ODRL (www.odrl.net)
 - International initiative of various supporters (e.g. Nokia)
 - Officially accepted by the Open Mobile Alliance (OMA) (formerly known as WAP Forum)
 - XML language, standardized through W3C



ODRL Example

```
<permission>
  <play>
    <constraint>
      <container type="in-or">
        <cpu/>
        <storage/>
      </container>
    </constraint>
  </play>
  <requirement>
    <container type="ex-or">
      <prepay>
        <payment>
          <amount currency="AUD">200.00</amount>
        </payment>
      </prepay>
      <peruse>
        <payment>
          <amount currency="AUD">1.50</amount>
        </payment>
      </peruse>
    </container>
  </requirement>
</permission>
```