

# An Application Example of Universal Profiling for Content Negotiation

Tayeb LEMLOUMA, Nabil LAYAÏDA

Opera Project, INRIA RHONE ALPES

January 2002

E-Mail: Tayeb.Lemlouma@inrialpes.fr, Nabil.Layaida@inrialpes.fr

We give here a complete example about the general format of profiles necessary to achieve the content negotiation. Profiles are defined in a way that gives a complete description of the environment and can be processed easily by the negotiation strategy to be implemented [3][5][4]. In the description we were based on the CC/PP [2] and RDF [1] model. We are intended to include all the diversity of users that may exist in a heterogeneous environment and using a universal description. This is why we avoid the use of some particular models which are limited to some kind of devices (such as the WAP UAProf [6] for WAP phones).

The example considers a mobile phone as end user and a server that provides HTTP services. Profiles given include the client profile and the related profiles in the client side, and a document instance profile and related profiles in the server side. In next steps of the work, a profile that describes network characteristics will be defined.

## 1 Client Side

We define here necessary profiles concerning the client side. The device taken as example represents a mobile phone.

**1.1 Client example:** a mobile phone.

### Client Profile : ClientProfile.xml

```
<?xml version="1.0"?>
<!-- Client Profile: "device-profiles/clientProfile.xml" -->
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
xmlns:neg="http://www.tayeb.negotiation.org/2002/01/01-neg#">
  <rdf:Description rdf:about="ClientProfile">
    <ccpp:component>
      <rdf:Description rdf:about="TerminalHardware">
        <rdf:type rdf:resource="HardwarePlatform" />
        <neg:DeviceName>Ericsson-R320</neg:DeviceName>
        <neg:screen>30X23mm</neg:screen>
        <neg:display>101X52Pixels</neg:display>
        <neg:PixelStretch>1.24</neg:PixelStretch>
        <neg:row>
          <rdf:Bag>
            <rdf:li rdf:parseType="Resource">
              <neg:type>Latin</neg:type>
              <neg:value>5</neg:value>
            </rdf:li>
          </rdf:Bag>
        </neg:row>
      </rdf:Description>
    </ccpp:component>
  </rdf:Description>
</rdf:RDF>
```

```

        <rdf:li rdf:parseType="Resource">
            <neg:type>Chinese</neg:type>
            <neg:value>3</neg:value>
        </rdf:li>
    </rdf:Bag>
</neg:row>
<neg:col>14</neg:col>
</rdf:Description>
</ccpp:component>
<ccpp:component>
    <rdf:Description rdf:about="OnlySupportedResources">
        <rdf:type rdf:resource="Resources" />
        <neg:OnlySupportedResources>
            <rdf:Bag>
                <rdf:li rdf:parseType="Resource">
                    <neg:type>service</neg:type>
                    <neg:serviceDetail>WML</neg:serviceDetail>
                    <neg:format>wml</neg:format>
                    <neg:profile>device-profiles/wml-profile.xml</neg:profile>
                </rdf:li>
                <rdf:li rdf:parseType="Resource">
                    <neg:type>image</neg:type>
                    <neg:format>wbmp</neg:format>
                    <neg:profile>device-profiles/wbmp-profile.xml</neg:profile>
                    <neg:format>gif</neg:format>
                    <neg:profile>device-profiles/gif-profile.xml</neg:profile>
                </rdf:li>
            </rdf:Bag>
        </neg:OnlySupportedResources>
    </rdf:Description>
</ccpp:component>
<ccpp:component>
    <rdf:Description rdf:about="PreferredSupportedResources">
        <rdf:type rdf:resource="Resources" />
        <neg:PreferredSupportedResources>
            <rdf:Seq>
                <rdf:li rdf:parseType="Resource">
                    <neg:type>image</neg:type>
                    <neg:format>wbmp</neg:format>
                    <neg:priorityLevel>2</neg:priorityLevel>
                    <neg:format>gif</neg:format>
                    <neg:priorityLevel>1</neg:priorityLevel>
                </rdf:li>
                <rdf:li rdf:parseType="Resource">
                    <neg:type>language</neg:type>
                    <neg:format>english</neg:format>
                    <neg:priorityLevel>2</neg:priorityLevel>
                    <neg:format>french</neg:format>
                    <neg:priorityLevel>1</neg:priorityLevel>
                </rdf:li>
            </rdf:Seq>
        </neg:PreferredSupportedResources>
    </rdf:Description>
</ccpp:component>
</rdf:Description>
</rdf:RDF>

```

## 1.2 Client Resource Profile 1: wml-profile.xml

```

<?xml version="1.0"?>
<!-- Client Resource Profile: "device-profiles/wml-profile.xml" -->
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
xmlns:neg="http://www.tayeb.negotiation.org/2002/01/01-neg#">
    <rdf:Description rdf:about="ResourceClientProfile">

```

```

<ccpp:component>
  <rdf:Description rdf:about="ContentRequierement">
    <rdf:type rdf:resource="Content" />
    <neg:content>
      <rdf:Bag>
        <rdf:li rdf:parseType="Resource">
          <neg:type>WML element</neg:type>
          <neg:signification>WML card</neg:signification>
          <neg:name>card</neg:name>
          <neg:specificConstraints>
            <rdf:Bag>
              <neg:maxSize>3000Bytes</neg:maxSize>
            </rdf:Bag>
          </neg:specificConstraints>
        </rdf:li>
        <rdf:li rdf:parseType="Resource">
          <neg:signification>WML text</neg:signification>
          <neg:OnlySupportedResources>
            <rdf:Bag>
              <rdf:li rdf:parseType="Resource">
                <neg:type>element</neg:type>
                <neg:signification>text style</neg:signification>
                <rdf:li>small</rdf:li>
                <rdf:li>bold</rdf:li>
                <rdf:li>emphasis</rdf:li>
                <rdf:li>strong</rdf:li>
              </rdf:li>
              <rdf:li rdf:parseType="Resource">
                <neg:type>WML attribute</neg:type>
                <neg:signification>text alignement</neg:signification>
                <name>p/align</name>
                <rdf:li>left</rdf:li>
                <rdf:li>center</rdf:li>
                <rdf:li>right</rdf:li>
              </rdf:li>
            </rdf:Bag>
          </neg:OnlySupportedResources>
        </rdf:li>
      </rdf:Bag>
    </neg:content>
  </rdf:Description>
</ccpp:component>
</rdf:Description>
</rdf:RDF>

```

### 1.3 Client Resource Profile 2: wbmp-profile.xml

```

<?xml version="1.0"?>
<!-- Client Resource Profile: "device-profiles/wbmp-profile.xml" -->
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
xmlns:neg="http://www.tayeb.negotiation.org/2002/01/01-neg#">
  <rdf:Description rdf:about="ResourceClientProfile">
    <ccpp:component>
      <rdf:Description rdf:about="ContentRequierement">
        <rdf:type rdf:resource="Content" />
        <neg:content>
          <rdf:Bag>
            <rdf:li rdf:parseType="Resource">
              <neg:type>image</neg:type>
              <neg:format>wbmp</neg:format>
              <neg:specificConstraints>
                <rdf:Bag>
                  <neg:maxSize>1500Bytes</neg:maxSize>
                </rdf:Bag>
            </rdf:li>
          </rdf:Bag>
        </neg:content>
      </rdf:Description>
    </ccpp:component>
  </rdf:Description>
</rdf:RDF>

```

```

        </neg:specificConstraints>
      </rdf:li>
    </rdf:Bag>
  </neg:content>
</rdf:Description>
</ccpp:component>
</rdf:Description>
</rdf:RDF>

```

## 1.4 Client Resource Profile 3: gif-profile.xml

```

<?xml version="1.0"?>
<!-- Client Resource Profile: "device-profiles/gif-profile.xml" -->
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
xmlns:neg="http://www.tayeb.negotiation.org/2002/01/01-neg#">
  <rdf:Description rdf:about="ResourceClientProfile">
    <ccpp:component>
      <rdf:Description rdf:about="ContentRequiereement">
        <rdf:type rdf:resource="Content" />
        <neg:content>
          <rdf:Bag>
            <rdf:li rdf:parseType="Resource">
              <neg:type>image</neg:type>
              <neg:format>gif</neg:format>
              <neg:specificConstraints>
                <rdf:Bag>
                  <neg:testExpression>heightXwidthLE12000Bytes</neg:testExpression>
                </rdf:Bag>
              </neg:specificConstraints>
            </rdf:li>
          </rdf:Bag>
        </neg:content>
      </rdf:Description>
    </ccpp:component>
  </rdf:Description>
</rdf:RDF>

```

## 2 Server side

In this part, we give profiles concerning the server side. Profiles consider a document instance that exists on content server. The document taken is simply an HTML page that uses some media resources.

### 2.1 Document Instance example : EXAMPLE.html

#### Document Instance Profile: EXAMPLE-html-profile.xml

```

<?xml version="1.0"?>
<!-- Document Instance Profile: "server-profiles/EXAMPLE-html-profile.xml" -->
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
xmlns:neg="http://www.tayeb.negotiation.org/2002/01/01-neg#">
  <rdf:Description rdf:about="DocumentInstanceProfile">
    <ccpp:component>
      <rdf:Description rdf:about="DocumentInstanceDescription">
        <rdf:type rdf:resource="DocumentResource"/>
        <neg:type>HTML</neg:type>
        <neg:format>html</neg:format>
        <neg:version>4.01</neg:version>
        <neg:doctype>http://www.w3.org/TR/html4/loose.dtd</neg:doctype>
      </rdf:Description>
    </ccpp:component>
  </rdf:Description>
</rdf:RDF>

```

```

        <neg:name>EXAMPLE.html</neg:name>
        <neg:size>910Bytes</neg:size>
        <neg:location>NEGOTIATION/WAP/</neg:location>
        <neg:server>http://yap.inrialpes.fr/</neg:server>
    </rdf:Description>
</ccpp:component>
<ccpp:component>
    <rdf:Description rdf:about="MultimediaContent">
        <rdf:type rdf:resource="MediaResources" />
        <neg:content>
            <rdf:Bag>
                <rdf:li rdf:parseType="Resource">
                    <neg:type>image</neg:type>
                    <neg:format>jpg</neg:format>
                    <neg:profile>profiles/background-jpg-profile.xml</neg:profile>
                    <neg:profile>profiles/phone-jpg-profile.xml</neg:profile>
                    <neg:profile>profiles/thank_you-jpg-profile.xml</neg:profile>
                </rdf:li>
                <rdf:li rdf:parseType="Resource">
                    <neg:type>image</neg:type>
                    <neg:format>gif</neg:format>
                    <neg:profile>profiles/realplayer-gif-profile.xml</neg:profile>
                </rdf:li>
                <rdf:li rdf:parseType="Resource">
                    <neg:type>audio</neg:type>
                    <neg:format>wav</neg:format>
                    <neg:profile>profiles/WapTechnology-wav-
                    profile.xml</neg:profile>
                </rdf:li>
            </rdf:Bag>
        </neg:content>
    </rdf:Description>
</ccpp:component>
<ccpp:component>
    <rdf:Description rdf:about="AdaptableResourcesDescription">
        <rdf:type rdf:resource="AdaptableResource" />
        <neg:AdaptableResources>
            <rdf:Alt>
                <rdf:li rdf:parseType="Resource">
                    <!-- a resume-->
                    <neg:type>textResume</neg:type>
                    <neg:format>xml</neg:format>
                    <neg:profile>profiles/EXAMPLE-xml-profile.xml</neg:profile>
                    <neg:adaptability>0.2</neg:adaptability>
                </rdf:li>
            </rdf:Alt>
        </neg:AdaptableResources>
    </rdf:Description>
</ccpp:component>
</rdf:Description>
</rdf:RDF>

```

## 2.2 Resource Profile: background-jpg-profile.xml

```

<?xml version="1.0"?>
<!-- Resource Profile: "server-profiles/background-jpg-profile.xml" -->
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
xmlns:neg="http://www.tayeb.negotiation.org/2002/01/01-neg#">
    <rdf:Description rdf:about="ResourceProfile">
        <ccpp:component>
            <rdf:Description rdf:about="MediaResourceDescription">
                <rdf:type rdf:resource="MediaResource"/>
                <neg:name>background.jpg</neg:name>
                <neg:format>Joined Picture Expert Group</neg:format>
            </rdf:Description>
        </ccpp:component>
    </rdf:Description>
</rdf:RDF>

```

```

<neg:size>25824Bytes</neg:size>
<neg:location>smil/images/</neg:location>
<neg:server>http://yap.inrialpes.fr/</neg:server>
<neg:dimension>800X600Pixels</neg:dimension>
<neg:resolution>
  <rdf:Bag>
    <rdf:li rdf:parseType="Resource">
      <neg:horizontal>300Pixels</neg:horizontal>
      <neg:vertical>300Pixels</neg:vertical>
    </rdf:li>
  </rdf:Bag>
</neg:resolution>
<neg:color>
  <rdf:Bag>
    <rdf:li rdf:parseType="Resource">
      <neg:ColorBit>24</neg:ColorBit>
      <neg:ColorRepresentation>>true RGB</neg:ColorRepresentation>
    </rdf:li>
  </rdf:Bag>
</neg:color>
</rdf:Description>
</ccpp:component>
<ccpp:component>
  <rdf:Description rdf:about="AdaptableResourcesDescription">
    <rdf:type rdf:resource="AdaptableResource"/>
    <neg:AdaptableResources>
      <rdf:Alt>
        <rdf:li rdf:parseType="Resource">
          <neg:type>image</neg:type>
          <neg:format>gif</neg:format>
          <neg:profile>profiles/background02-gif-profile.xml</neg:profile>
          <neg:adaptatbilityValue>3</neg:adaptatbilityValue>
        </rdf:li>
        <rdf:li rdf:parseType="Resource">
          <neg:type>method</neg:type>
          <neg:outputformats>
            <!-- includes just the formats that can be obtained from the original resource
            format using the adaptation -->
            <rdf:Bag>
              <rdf:li>gif</rdf:li>
              <rdf:li>wbmp</rdf:li>
            </rdf:Bag>
          </neg:outputformats>
          <neg:profile>profiles/jpgtransformer-class-profile.xml</neg:profile>
        </rdf:li>
      </rdf:Alt>
    </neg:AdaptableResources>
  </rdf:Description>
</ccpp:component>
</rdf:Description>
</rdf:RDF>

```

## 2.3 Adaptation Method Profile 1: XML2LaTeX-xsl-profile.xml

```

<?xml version="1.0"?>
<!-- Adaptation Method Profile: "server-profiles/XML2LaTeX-xsl-profile.xml" -->
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
xmlns:neg="http://www.tayeb.negotiation.org/2002/01/01-neg#">
  <rdf:Description rdf:about="AdaptationMethodProfile">
    <ccpp:component>
      <rdf:Description rdf:about="AdaptationMethodResourceDescription">
        <rdf:type rdf:resource="AdaptationMethodResource"/>

```

```

        <neg:type>XSLT style sheet</neg:type>
        <neg:format>xsl</neg:format>
        <neg:name>XML2LaTeX.xsl</neg:name>
        <neg:size>19568Bytes</neg:size>
        <neg:location>opera/people/Tayeb.Lemlouma/MULTIMEDIA/XSLT/</neg:location>
        <neg:server>http://www.inrialpes.fr/</neg:server>
    </rdf:Description>
</ccpp:component>

<ccpp:component>
    <rdf:Description rdf:about="AdaptationMethodDescription">
        <rdf:type rdf:resource="AdaptationMethod"/>
        <neg:SubAdaptationMethods>
            <rdf:Bag>
                <rdf:li rdf:parseType="Resource">
                    <neg:InputRequirements>
                        <rdf:Bag>
                            <rdf:li rdf:parseType="Resource">
                                <neg:type>XML</neg:type>
                                <neg:format>xml</neg:format>
                                <neg:DTD>http://www.inrialpes.fr/opera/people/Tayeb.Lemlouma/
                                    MULTIMEDIA/XSLT/LaTeXDTD.dtd</neg:DTD>
                            </rdf:li>
                        </rdf:Bag>
                    </neg:InputRequirements>
                    <neg:OutputDescription>
                        <rdf:Bag>
                            <rdf:li rdf:parseType="Resource">
                                <neg:type>LATEX</neg:type>
                                <neg:format>tex</neg:format>
                            </rdf:li>
                        </rdf:Bag>
                    </neg:OutputDescription>
                </rdf:li>
            </rdf:Bag>
        </neg:SubAdaptationMethods>
    </rdf:Description>
</ccpp:component>

</rdf:Description>
</rdf:RDF>

```

## 2.4 Adaptation Method Profile 2: ImageEncoder-class-profile.xml

```

<?xml version="1.0"?>
<!-- Adaptation Method Profile: "server-profiles/ImageEncoder-class-profile.xml" -->
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
xmlns:neg="http://www.tayeb.negotiation.org/2002/01/01-neg#">
    <rdf:Description rdf:about="AdaptationMethodProfile">
        <ccpp:component>
            <rdf:Description rdf:about="AdaptationMethodResourceDescription">
                <rdf:type rdf:resource="AdaptationMethodResource"/>
                <neg:type>JAVA program</neg:type>
                <neg:format>class</neg:format>
                <neg:name>ImageEncoder.class</neg:name>
                <neg:size>19770Bytes</neg:size>
                <neg:location>NEGOTIATION/</neg:location>
                <neg:server>http://yap.inrialpes.fr/</neg:server>
            </rdf:Description>
        </ccpp:component>
    </ccpp:component>
    <rdf:Description rdf:about="AdaptationMethodDescription">
        <rdf:type rdf:resource="AdaptationMethod"/>
    </rdf:Description>
</rdf:RDF>

```

```

<neg:SubAdaptationMethods>
  <rdf:Bag>
    <rdf:li rdf:parseType="Resource">
      <neg:InputRequirements>
        <rdf:Bag>
          <rdf:li rdf:parseType="Resource">
            <neg:type>image</neg:type>
            <neg:format>jpg</neg:format>
            <neg:specificConstraints>
              <rdf:Bag>
                <neg:maxHeight>100Pixels</neg:maxHeight>
                <neg:maxWidth>100Pixels</neg:maxWidth>
                <neg:maxSize>1500Bytes</neg:maxSize>
              </rdf:Bag>
            </neg:specificConstraints>
          </rdf:li>
        </rdf:Bag>
      </neg:InputRequirements>
      <neg:OutputDescription>
        <rdf:Bag>
          <rdf:li rdf:parseType="Resource">
            <neg:type>image</neg:type>
            <neg:format>gif</neg:format>
          </rdf:li>
          <rdf:li rdf:parseType="Resource">
            <neg:type>image</neg:type>
            <neg:format>wbmp</neg:format>
          </rdf:li>
        </rdf:Bag>
      </neg:OutputDescription>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <neg:InputRequirements>
        <rdf:Bag>
          <rdf:li rdf:parseType="Resource">
            <neg:type>image</neg:type>
            <neg:format>bmp</neg:format>
            <neg:specificConstraints>
              <rdf:Bag>
                <neg:maxColorNumber>16</neg:maxColorNumber>
              </rdf:Bag>
            </neg:specificConstraints>
          </rdf:li>
        </rdf:Bag>
      </neg:InputRequirements>
      <neg:OutputDescription>
        <rdf:Bag>
          <rdf:li rdf:parseType="Resource">
            <neg:type>image</neg:type>
            <neg:format>jpg</neg:format>
          </rdf:li>
        </rdf:Bag>
      </neg:OutputDescription>
    </rdf:li>
  </rdf:Bag>
</neg:SubAdaptationMethods>
</rdf:Description>
</ccpp:component>
</rdf:Description>
</rdf:RDF>

```



### 3 Negotiation

The negotiation strategy must be able to process and handles defined profiles in order to deliver a content that reply to the client characteristics, capabilities and preferences. Normally, the negotiation strategy is applied by the content server or an intermediate proxy [3] and may require several messages exchange between the client and the server.

### 4 References

1. W3C, Resources Description Framework, <http://www.w3.org/RDF>
2. W3C, Composite Capabilities / Preferences Profiles, <http://www.w3.org/TR/CCPP-struct-vocab/>
3. Tayeb Lemlouma, Nabil Layaïda, NAC: A Basic Core for the Adaptation and Negotiation of Multimedia Services, <http://www.inrialpes.fr/opera/people/Tayeb.Lemlouma/Papers/ANegoP.pdf>
4. Tayeb Lemlouma, Nabil Layaïda, A Framework for Media Resource Manipulation in an Adaptation and Negotiation Architecture, <http://www.inrialpes.fr/opera/people/Tayeb.Lemlouma/Papers/RSRS.pdf>
5. Tayeb Lemlouma, Nabil Layaïda, The Negotiation of Multimedia Content Services in Heterogeneous Environments, <http://www.inrialpes.fr/opera/people/Tayeb.Lemlouma/Papers/MMM2001.pdf>
6. WAP Forum, WAG UAProf version 20-Oct-2001, <http://www1.wapforum.org/tech/documents/WAP-248-UAProf-20011020-a.pdf>