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Harmonization of Session and Capability Descriptions between SDPng and MPEG-21 Digital Item Adaptation

draft-guenkova-mmusic-mpeg21-sdpng-00

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Motivation



- **SDPng – technology specific / transport oriented**
 - Capabilities – e.g. codecs
 - Definitions – e.g. protocols, IP-addresses, ports
 - Configurations – application-specific associations between Capabilities and Definitions
 - Constraints – provides constraints on combinations of configurations
 - Information – provides additional meta-information on sessions and individual components
- **MPEG DIA – technology independent / presentation oriented**
 - Usage Environment Description (UED) for capabilities
 - Codecs with MPEG-7 MDS
 - Other capabilities descriptions possible
 - UED for constraints
 - upper limits of session/components performance
 - Adaptation meta-data – BSD links



MPEG and SDPng integration



- Integration challenge
 - Minimal
 - Both apply XML
 - Integration over XML Schema convergence
 - draft is co-authored by MPEG-21 experts

- Integration model
 - MPEG for technology independent descriptions – Covers the general needs of any multimedia service/session description and signalling
 - SDPng for technology dependant descriptions – Covers specific needs of session signalling (e.g. with SAP, SIP, RTSP, MGCP) and multimedia transport (e.g. with RTP)

- Integration goals
 - Session adaptation management for heterogeneous clients
 - Distributed content delivery and QoS specific adaptation based on MPEG-21 DIA
 - Integration of IETF protocols to specify transport mechanisms for MPEG-21 DIA components



MPEG and SDPng integration



- Integration structure
 - All SDPng major containers are reused
 - <cap> integrates UED definitions for audio and video capabilities
 - <def> remains the same with minimal changes to the SDPng RTP Package
 - <cfg> remains the same
 - <component>/<alt> containers encapsulate some XML attribute redefinitions
 - <constraints>
 - integrates UED descriptions for constraints at terminal and at network level
 - <constraint> for specifying constraints at different levels of abstractions (session, component, alt)
 - <info> integrates BSD Link information for media adaptation metadata
 - Important changes/enhancements
 - Application of external references with “href”
 - Application of the MPEG-7 MDS
 - namespace for codec definitions (RTP/AVP (RFC 3551) namespace is not used)
 - implicit (href) or explicit (explicit definition in the SDPng document) library for codec specifications
 - Fixing some of the applied name-value pairs to standardise the referencing between components inside the SDPng document



MPEG and SDPng <cap> integration



```

<cap>
  <sdpng-dia:mpeg21-DIA-definition>
    <sdpng-dia:MPEG21-DIA>
      <m21-dia:UsageEnvironmentProperty xsi:type="m21-dia:TerminalsType">
        <m21-dia:Terminal>
          <m21-dia:TerminalCapability xsi:type="m21-dia:CodecCapabilitiesType">
            <m21-dia:Decoding xsi:type="m21-dia:AudioCapabilitiesType">
              <m21-dia:Format href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:5.8.1">
                <mpeg7:Name xml:lang="en">MPEG-4 Mobile Audio Internetworking Profile @ Level 1</mpeg7:Name>
              </m21-dia:Format>
              <m21-dia:Format href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:4.4">
                <mpeg7:Name xml:lang="en">MP3</mpeg7:Name>
              </m21-dia:Format>
            </m21-dia:Decoding>
            <m21-dia:Decoding xsi:type="m21-dia:VideoCapabilitiesType">
              <m21-dia:Format href="urn:mpeg:mpeg7:cs:VisualFileFormatCS:2001:7">
                <mpeg7:Name xml:lang="en">H261</mpeg7:Name>
              </m21-dia:Format>
              <m21-dia:Format href="urn:mpeg:mpeg7:cs:VisualFileFormatCS:2001:8">
                <mpeg7:Name xml:lang="en">H263</mpeg7:Name>
              </m21-dia:Format>
            </m21-dia:Decoding>
          </m21-dia:TerminalCapability>
        </m21-dia:Terminal>
      </m21-dia:UsageEnvironmentProperty>
    </sdpng-dia:MPEG21-DIA>
  </sdpng-dia:mpeg21-DIA-definition>
</cap>

```

Audio

Video



MPEG and SDPng <def> integration



```

<def>
<!-- names of the "rtp:udp" (e.g. name="rtp-cfg1") is fixed with pattern for referencing purposes -->
  <rtp:udp name="rtp-cfg1">
    <rtp:network>IP6</rtp:network>
    <rtp:ip-addr>::1</rtp:ip-addr>
    <rtp:rtp-port>9546</rtp:rtp-port>
  </rtp:udp>
  <rtp:udp name="rtp-cfg2">
    <rtp:network>IP6</rtp:network>
    <rtp:ip-addr>::1</rtp:ip-addr>
    <rtp:rtp-port>9948</rtp:rtp-port>
  <!-- attributes are optional, except 'pt', In original SDPng "rtp:pt" has simple content -->
  <rtp:pt pt="31"/>
  </rtp:udp>
  <rtp:udp name="rtp-cfg3">
    <rtp:network>IP6</rtp:network>
    <rtp:ip-addr>::1</rtp:ip-addr>
    <rtp:rtp-port>9548</rtp:rtp-port>
    <rtp:pt pt="34"/>
  </rtp:udp>
</def>

```



MPEG and SDPng <cfg> integration



<cfg>

```
<component name="audiocomponent001" media="audio" direction="recvonly">
```

```
<alt name="audio001">
```

“name”-s fixed with pattern, new attr. “direction”

```
<audio:codec href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:5.8.1"/>
```

```
<rtp:udp ref="rtp-cfg1">
```

```
<rtp:pt pt="99">
```

```
<rtp:fmp key="streamtype">3</rtp:fmp>
```

```
<rtp:fmp key="maxPS" unit="Byte">1500</rtp:fmp>
```

```
<rtp:fmp key="maxBS" unit="kbit">1000</rtp:fmp>
```

Format specific parameters like in SDP, e.g. for definition of dynamic payload types

```
</rtp:pt>
```

```
</rtp:udp>
```

```
</alt>
```

```
<alt name="audio002">
```

```
<audio:codec href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:4.4"/>
```

```
<rtp:udp ref="rtp-cfg1">
```

```
<rtp:pt pt="86" frequency="8000" chan="2">
```

Definition like in SDP (frequency+chan)

```
<rtp:fmp key="bitrate">16000</rtp:fmp>
```

```
</rtp:pt>
```

```
</rtp:udp>
```

```
</alt>
```

```
</component>
```

```
</cfg>
```




MPEG and SDPng <constraints> integration

Abstraction level “session”, Terminal Constraints



```

</constraints>
  <constraint name="session" xsi:type="sdpng-dia:mpeg21DIA-constraint">
    <sdpng-dia:MPEG21-DIA xsi:type="m21-dia:TerminalsType">
      <m21-dia:Terminal>
        <m21-dia:TerminalCapability xsi:type="m21-dia:DisplaysType">
          <m21-dia:Display>
            <m21-dia:DisplayCapability xsi:type="m21-dia:DisplayCapabilityType" colorCapable="true"
              contrastRatio="700" refreshRate="30">
              <m21-dia:Mode>
                <m21-dia:Resolution horizontal="176" vertical="144"/>
              </m21-dia:Mode>
              <m21-dia:ColorBitDepth blue="8" green="8" red="8"/>
              <m21-dia:CharacterSetCode>US-ASCII</m21-dia:CharacterSetCode>
            </m21-dia:DisplayCapability>
          </m21-dia:Display>
        </m21-dia:TerminalCapability>
        <m21-dia:TerminalCapability xsi:type="m21-dia:AudioOutputsType">
          <m21-dia:AudioOutput>
            <m21-dia:AudioOutputCapability numChannels="2" xsi:type="m21-dia:AudioOutputCapabilitiesType">
              <m21-dia:Mode id="ID" samplingFrequency="44100" bitsPerSample="16"/>
            </m21-dia:AudioOutputCapability>
          </m21-dia:AudioOutput>
        </m21-dia:TerminalCapability>
      </constraint>
    </constraints>
  
```



MPEG and SDPng <constraints> integration



Abstraction level “component”, Network Constraints

</constraints>

<constraint name="component" ref="videostream001" xsi:type="sdpng-dia:mpeg21DIA-constraint">

<sdpng-dia:MPEG21-DIA xsi:type="m21-dia:NetworksType">

<m21-dia:Network>

<m21-dia:NetworkCharacteristic maxCapacity="384000" minGuaranteed="32000" xsi:type="m21-dia:NetworkCapabilityType"/>

<m21-dia:NetworkCharacteristic xsi:type="m21-dia:NetworkConditionType">

<m21-dia:AvailableBandwidth average="80000" maximum="256000" minimum="330"/>

<m21-dia:Delay delayVariation="66" packetTwoWay="330"/>

<m21-dia:Error packetLossRate="0.05"/>

</m21-dia:NetworkCharacteristic>

</m21-dia:Network>

</sdpng-dia:MPEG21-DIA>

</constraint>

</constraints>

The component “videostream001” has to be defined within the <cfg> container.



MPEG and SDPng <info> integration



BSD Link descriptions

```

<info>
  <sdpng-dia:BSDLiveLink ref="audiocomponent001">
    <sdpng-dia:bsdLink>
      <m21-dia:SteeringDescriptionRef uri="AQoS_bsac.xml"/>
      <m21-dia:BSDRef uri="#mysong_bsac_bsd"/>
      <m21-dia:BSDTransformationRef uri="bsac.xml"
        type="http://www.w3.org/1999/XSL/Transform"/>
      <m21-dia:Parameter xsi:type="m21-dia:IOPinRefType" name="nlayers">
        <m21-dia:Value>LAYERS_OF_SCALABLE_AUDIO</m21-dia:Value>
      </m21-dia:Parameter>
    </sdpng-dia:bsdLink>
    <sdpng-dia:bsdHull>
      <sdpng-dia:Description xsi:type="gbsd:gBSDType" addressUnit="bit"
        addressMode="Absolute" bs1:bitstreamURI="mysong.bsac" id="mysong_bsac_bsd">
        <gbsd:gBSDUnit length="0"/>
      </sdpng-dia:Description>
    </sdpng-dia:bsdHull>
  </sdpng-dia:BSDLiveLink>
</info>

```



Conclusions



- SDPng + MPEG21 DIA provides
 - Integration of MPEG-21 DIA concepts into IETF transport and signalling frameworks
 - Separation of the capabilities into technology dependent and independent ones. Allows the independent development of SDPng and MPEG
 - Quality of Service definitions at different abstraction levels (I.e. session, component, alt) in form of constraints
- open issues
 - SDPng and MPEG identification/naming of codecs
 - RTP AVP (RFC 3551) names vs. MPEG7 MDS names