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9
Apêndice A

Este apêndice descreve os elementos e atributos das áreas funcionais de NCL 2.0 e NCL 2.1. Os símbolos nas tabelas possuem os seguintes significados: "?" opcional, "|" ou, "*" zero ou mais ocorrências e "+" uma ou mais ocorrências.

9.1.
NCL 2.0

Área Funcional	Elementos	Atributos	Conteúdo
Structure	ncl	id	(head?, body)
	head		(Metainformation*, layout?, descriptorBase?)
	body		(BasicMedia|composite|switch|linkBase)*
Components	animation, audio, img, text, textstream, vídeo, ref	id, src, type, descriptor, label	area*, attribute*
	composite	id, descriptor, xtemplate, label	(areaComposite*, port*, attribute*, componentPresentation*, (BasicMedia|composite|linkBase|switch)*)
Interfaces	Area	id, coords, begin, end, dur, text, position, first, last, label	Vazio
	areaComposite	id, label, componentList	Vazio
	port	id, component, port, label	Vazio
	attribute	id, name	Vazio
	portSwitch	id, label	port+
Linking	bind	role, component,	Vazio

		port	
	param	name, value	Vazio
	link	id, xconnector	(param*, bind+)
	lref	id, src	Vazio
	linkBase	id	(link|lref)+
Connectors	xconnector	id	(param*, role+, glue)
	param	name, type	Vazio
	connectorBase	id	xconnector+
	compositeConnector	id	(role+, glue)
Composite Templates	xtemplate	id	(vocabulary, constraints?)
	templateBase	id	xtemplate+
Layout	layout	src, type	topLayout*
	topLayout	id, title, left, top, height, width, backgroundColor, zIndex, scroll, open, close, movable, resizable, visible	region*
	region	id, title, left, top, height, width, backgroundColor, zIndex, scroll, open, close, fit, visible	region*
Presentation Specification	descriptor	id, player, dur, min, max, region, enableTimeBar, style, soundLevel, balanceLevel, trebleLevel, bassLevel,	Vazio
	descriptorBase		(descriptor|descriptorSwitch)*
	componentPresentation	component, descriptor	Vazio
Presentation Control	switch	id,	(portSwitch*, componentPresentation*, (BasicMedia|composite|switch)+)
	descriptorSwitch	id	descriptor+

9.2. NCL 2.1

Área Funcional	Elementos	Atributos	Conteúdo
Structure	Ncl	id	(head?, body)
	Head		(Metainformation*, layout?, descriptorBase?)
	Body		(BasicMedia|composite|switch|linkBase)*
Components	Animation, audio, img, text, textstream, vídeo	id, src, ref, type, descriptor, label, implicitDur	area*, attribute*
	Composite	id, ref, descriptor, xtemplate, label	(areaComposite*, port*, attribute*, bindDescriptor*, (BasicMedia|composite|linkBase|switch)*)
Interfaces	Area	id, coords, begin, end, dur, text, position, first, last, label	Vazio
	areaComposite	id, label, componentList	Vazio
	Port	id, component, port, label	Vazio
	Attribute	id, name	Vazio
	portSwitch	id, label	port+
Linking	Bind	role, component, port	Vazio
	Param	name, value	Vazio
	Link	id, xconnector	(param*, bind+)
	Lref	id, src	Vazio
	linkBase	id	(link|lref)+
Connectors	xconnector	id	(param*, role+, glue)
	Param	name, type	Vazio
	connectorBase	id	xconnector+
	compositeConnector	id	(role+, glue)
Composite Templates	Xtemplate	id	(vocabulary, constraints?)
	templateBase	id	xtemplate+
Layout	Layout	src, type, ref	topLayout*

	topLayout	id, title, left, top, height, width, backgroundColor, zIndex, scroll, open, close, movable, resizable, visible	region*
	Region	id, title, left, top, height, width, backgroundColor, zIndex, scroll, open, close, fit, visible	region*
Presentation Specification	Descriptor	id, player, explicitDur, min, max, ref, region, enableTimeBar, style, soundLevel, balanceLevel, trebleLevel, bassLevel, nodeRule	descriptorParam*
	descriptorParam	name, value	
	descriptorBase	ref	(descriptor|descriptorSwitch)*
	bindDescriptor	component, descriptor	Vazio
Presentation Control	Switch	id, ref	(portSwitch*, bindDescriptor*, bindRule*,(BasicMedia|composite|switch)+)
	descriptorSwitch	id	descriptor+, bindRule*
	presentationRuleBase	ref	(presentationRule | compositePresentationRule)+
	presentationRule	ref	Vazio
	compositePresentationRule	ref	(presentationRule | compositePresentationRule)+
	bindRule		Vazio
Timing	costFunctionBase	id, ref	costFunction+
	costFunction	id, type, ref, mathMLRef	costFunctionParam*
	costFunctionParam	name, value	Vazio

9.3. XConnector 2.1

Elementos	Atributos	Conteúdo
connectorBase	id, name, description	(causalConnector, constraintConnector)*
causalConnector	id, name, description	param, (conditionRole, propertyRole)*, actionRole*, causalGlue
constraintConnector	id, name, description	param, propertyRole*, constraintGlue
param	name, type	
actionRole	id, eventType, attributeName, min, max, actionType, show, delay, repeat, delayBetweenRep, initialValue, finalValue, duration	
conditionRole	id, eventType, attributeName, min, max	(eventStateCondition, eventTransitionCondition, eventAttributeCondition, compoundCondition)
eventStateCondition	isNegated, state, comparator	
eventTransitionCondition	isNegated, transition	
eventAttributeCondition	isNegated, comparator, attributeType, value, attributeName	
compoundCondition	isNegated, operator	(eventStateCondition, eventTransitionCondition, eventAttributeCondition, compoundCondition)*
propertyRole	id, eventType, attributeName, min, max	(eventStateProperty, eventTransitionProperty, eventAttributeProperty)
eventStateProperty	state	
eventTransitionProperty	transition, offset	
eventAttributeProperty	attributeType, offset	
causalGlue		(simpleTriggerExpression | compoundTriggerExpression), (simpleActionExpression | compoundActionExpression)
constraintGlue		(propertyToPropertyExpression | attributeToValueExpression |

		eventStateToValueExpression | compoundPropertyExpression)
simpleTriggerExpression	isNegated, minDelay, maxDelay, conditionRole, qualifier	
compoundTriggerExpression	isNegated, minDelay, maxDelay, operator	(simpleTriggerExpression| compoundTriggerExpression)* | ((simpleTriggerExpression| compoundTriggerExpression), (propertyToPropertyExpression | attributeToValueExpression | eventStateToValueExpression | compoundPropertyExpression))*
propertyToPropertyExpression	comparator, firstPropertyRole, firstQualifier, secondPropertyRole, secondQualifier	
attributeToValueExpression	comparator, propertyRole, qualifier, value	
eventStateToValueExpression	comparator, propertyRole, qualifier, state	
compoundPropertyExpression	operator	(propertyToPropertyExpression | attributeToValueExpression | eventStateToValueExpression | compoundPropertyExpression)*
simpleActionExpression	delay, actionRole, qualifier	
compoundActionExpression	delay, operator	(simpleActionExpression | compoundActionExpression)*

10
Apêndice B

Especificação da linguagem NCL 2.1.

10.1.
NCL21.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <!-- include the schema files for the building block types -->
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
struct.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
interface.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
link.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
component.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
timing.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
layout.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
presentation.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
control.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
connector.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
compositeTemplate.xsd"/>

    <!-- import the NCL 2.0 language namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- import the definitions in the modules namespaces -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Structure"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-Structure.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/BasicMedia"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-BasicMedia.xsd"/>
```

```
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicComposite"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-BasicComposite.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/MediaInterface"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-MediaInterface.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeInterface"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
CompositeInterface.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/AttributeInterface"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
AttributeInterface.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/SwitchInterface"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-SwitchInterface.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Linking"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-Linking.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XConnector"
schemaLocation="file:../mediaContent/data/schemas/XConnector.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeConnector"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
CompositeConnector.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate"
schemaLocation="file:../mediaContent/data/schemas/XTemplate.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/TemplateUse"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-XTemplateUse.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/BasicTiming"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-BasicTiming.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/BasicLayout"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-BasicLayout.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicDescriptor"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-BasicDescriptor.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeDescriptor"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
CompositeDescriptor.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/TestAttributes"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-TestAttributes.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/ContentControl"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-ContentControl.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/DescriptorControl"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-
DescriptorControl.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/CostFunction"
```

```
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-CostFunction.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/TestRules"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-TestRules.xsd"/>
</schema>
```

10.2. NCL-AttributeInterface.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:AttributeInterface="http://www.telemidia.puc-
rio.br/specs/xml/ncl/AttributeInterface"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/AttributeInterface"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="attribute" type="ncllang:attributeInterfaceType"
substitutionGroup="ncllang:attribute"/>

    <!-- declare global attributes in this module -->
</schema>
```

10.3. NCL-BasicComposite.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:BasicComposite="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicComposite"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicComposite"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
```

```
    <element name="composition" type="ncllang:compositionType"
substitutionGroup="ncllang:composition"/>
</schema>
```

10.4. NCL-BasicDescriptor.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:BasicDescriptor="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicDescriptor"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicDescriptor"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global attributes in this module -->
    <attribute name="descriptor" type="IDREF"/>

    <!-- declare global elements in this module -->
    <element name="descriptor" type="ncllang:descriptorType"
substitutionGroup="ncllang:descriptor"/>
    <element name="descriptorBase" type="ncllang:descriptorBaseType"
substitutionGroup="ncllang:descriptorBase"/>
    <element name="descriptorParam" type="ncllang:descriptorParamType"
substitutionGroup="ncllang:descriptorParam"/>
</schema>
```

10.5. NCL-BasicLayout.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:BasicLayout="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicLayout"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicLayout"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
```

```
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="layout" type="ncllang:layoutType"
substitutionGroup="ncllang:layout"/>
    <element name="topLayout" type="ncllang:topLayoutType"
substitutionGroup="ncllang:topLayout"/>
    <element name="region" type="ncllang:regionType"
substitutionGroup="ncllang:region"/>

    <!-- declare global attributes in this module -->
    <attribute name="region" type="IDREF"/>
</schema>
```

10.6. NCL-BasicMedia.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:BasicMedia="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicMedia"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/BasicMedia"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="text" type="ncllang:mediaType"
substitutionGroup="ncllang:text"/>
    <element name="img" type="ncllang:mediaType" substitutionGroup="ncllang:img"/>
    <element name="audio" type="ncllang:mediaType"
substitutionGroup="ncllang:audio"/>
    <element name="animation" type="ncllang:mediaType"
substitutionGroup="ncllang:animation"/>
    <element name="video" type="ncllang:mediaType"
substitutionGroup="ncllang:video"/>
    <element name="textstream" type="ncllang:mediaType"
substitutionGroup="ncllang:textstream"/>

    <!-- declare global attributes in this module -->
    <attribute name="type" type="string"/>
    <attribute name="src" type="anyURI"/>
</schema>
```

10.7.
NCL-BasicTiming.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:BasicTiming="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicTiming"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicTiming"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>

    <!-- declare global attributes in this module -->
    <attribute name="dur" type="string"/>
    <attribute name="min" type="string"/>
    <attribute name="max" type="string"/>
    <attribute name="implicitDur" type="string"/>
</schema>
```

10.8.
NCL-component.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- define the media src attributes-->
    <attribute name="type" type="string"/>
    <attribute name="src" type="anyURI"/>
    <!-- define the media src attribute group -->
    <attributeGroup name="mediaSrcAttrs">
        <attribute name="type" type="string" use="optional"/>
        <attribute name="src" type="anyURI" use="optional"/>
        <attribute name="ref" type="string" use="optional"/>
    </attributeGroup>

    <complexType name="mediaPrototype">
        <attributeGroup ref="ncl:mediaSrcAttrs" />
    </complexType>

    <!--    define the composition element prototype    -->
```

```
    <complexType name="compositionPrototype">
    </complexType>

    <!-- define the global media elements -->
    <element name="text" type="ncllang:mediaType"
substitutionGroup="ncllang:text"/>
    <element name="img" type="ncllang:mediaType" substitutionGroup="ncllang:img"/>
    <element name="audio" type="ncllang:mediaType"
substitutionGroup="ncllang:audio"/>
    <element name="animation" type="ncllang:mediaType"
substitutionGroup="ncllang:animation"/>
    <element name="video" type="ncllang:mediaType"
substitutionGroup="ncllang:video"/>
    <element name="textstream" type="ncllang:mediaType"
substitutionGroup="ncllang:textstream"/>
    <element name="ref" type="ncllang:mediaType" substitutionGroup="ncllang:ref"/>

    <!-- define the global composition element -->
    <element name="composition" type="ncllang:compositionType"
substitutionGroup="ncllang:composition"/>
</schema>
```

10.9. NCL-CompositeConnector.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:CompositeConnector="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeConnector"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeConnector"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="compositeConnector" type="ncllang:compositeConnectorType"
substitutionGroup="ncllang:compositeConnector"/>
    <!--
    <element name="partialLinkBase" type="ncllang:partialLinkBaseType"
substitutionGroup="ncllang:partialLinkBase"/>
    -->
    <element name="partialLinkBase" substitutionGroup="ncllang:partialLinkBase"/>
</schema>
```

10.10. NCL-CompositeDescriptor.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:CompositeDescriptor="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeDescriptor"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeDescriptor"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="componentPresentation" type="ncllang:componentPresentationType"
substitutionGroup="ncllang:componentPresentation"/>
    <element name="bindDescriptor" type="ncllang:bindDescriptorType"
substitutionGroup="ncllang:bindDescriptor"/>
</schema>
```

10.11. NCL-CompositeInterface.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:CompositeInterface="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeInterface"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CompositeInterface"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="compositeArea" type="ncllang:compositeAnchorType"
substitutionGroup="ncllang:compositeArea"/>
    <element name="port" type="ncllang:compositePortType"
substitutionGroup="ncllang:port"/>
</schema>
```

10.12.
NCL-compositeTemplate.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <!-- import the definitions in the XTemplate namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate"
schemaLocation="file:../mediaContent/data/schemas/XTemplate.xsd"/>

    <!-- declare global attributes in this module -->
    <attribute name="xtemplate" type="anyURI"/>
    <attribute name="label" type="string"/>

    <!-- define the CompositeTemplateUseAttrs attribute group -->
    <attributeGroup name="CompositeTemplateUseAttrs">
        <attribute name="xtemplate" type="anyURI"/>
        <attribute name="label" type="string"/>
    </attributeGroup>

    <!-- define the TemplateComponentAttrs attribute group -->
    <attributeGroup name="TemplateComponentAttrs">
        <attribute name="label" type="string"/>
    </attributeGroup>
</schema>
```

10.13.
NCL-connector.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <!-- import the definitions in the XConnector namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XConnector"
schemaLocation="file:../mediaContent/data/schemas/XConnector.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!--    define the composite connector element prototype    -->

    <complexType name="compositeConnectorPrototype">
    </complexType>

    <complexType name="compositeRolePrototype">
```

```
        <attribute name="id" type="string" use="required"/>
        <attribute name="partialLink" type="IDREF" use="required"/>
        <attribute name="role" type="string" use="required"/>
    </complexType>

    <complexType name="compositeGluePrototype">
    </complexType>

    <complexType name="partialLinkBasePrototype">
    </complexType>

    <!-- define the global composite element -->
    <element name="compositeConnector" type="ncllang:compositeConnectorType"
substitutionGroup="ncllang:compositeConnector"/>

    <element name="partialLinkBase" type="ncllang:partialLinkBaseType" />
    <element name="role" type="ncllang:compositeRoleType"
substitutionGroup="ncllang:role"/>
    <element name="glue" type="ncllang:compositeGlueType"
substitutionGroup="ncllang:glue"/>
</schema>
```

10.14. NCL-ContentControl.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ContentControl="http://www.telemidia.puc-
rio.br/specs/xml/ncl/ContentControl"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/ContentControl"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <!-- import the definitions in the NCL namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="switch" type="ncllang:switchType"
substitutionGroup="ncllang:switch"/>
    <element name="bindRule" type="ncllang:bindRuleType"
substitutionGroup="ncllang:bindRule"/>
</schema>
```

10.15. NCL-control.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- define the switch element prototype -->
    <complexType name="switchPrototype">
    </complexType>
    <complexType name="switchPrototype2">
    </complexType>

    <!-- define the descriptor switch element prototype -->
    <complexType name="descriptorSwitchPrototype">
    </complexType>

    <!-- define the bindRule element prototype -->
    <complexType name="bindRulePrototype">
               <attribute name="rule" type="IDREF" use="required"/>
               <attribute name="component" type="IDREF" use="required"/>
    </complexType>

    <complexType name="presentationRuleBasePrototype">
    </complexType>

    <complexType name="presentationRulePrototype">
        <attribute name="var" type="string" use="required"/>
        <attribute name="value" type="string" use="required"/>
        <attribute name="op" use="required">
          <simpleType>
             <restriction base="string">
                <enumeration value="eq"/>
                <enumeration value="ne"/>
                <enumeration value="gt"/>
                <enumeration value="ge"/>
                <enumeration value="lt"/>
                <enumeration value="le"/>
            </restriction>
          </simpleType>
        </attribute>
    </complexType>

    <complexType name="compositePresentationRulePrototype">
        <attribute name="op" use="required">
          <simpleType>
```

```
            <restriction base="string">
               <enumeration value="and"/>
               <enumeration value="or"/>
            </restriction>
          </simpleType>
        </attribute>
    </complexType>

    <!-- define the global content control elements -->
    <element name="switch" type="ncllang:switchType"
substitutionGroup="ncllang:switch"/>
    <element name="descriptorSwitch" type="ncllang:descriptorSwitchType"
substitutionGroup="ncllang:descriptorSwitch"/>
    <element name="bindRule" type="ncllang:bindRuleType"
substitutionGroup="ncllang:bindRule"/>

    <element name="presentationRule" type="ncllang:presentationRuleType"
substitutionGroup="ncllang:presentationRule"/>
    <element name="compositePresentationRule"
type="ncllang:compositePresentationRuleType"
substitutionGroup="ncllang:compositePresentationRule"/>
    <element name="presentationRuleBase" type="ncllang:presentationRuleBaseType"
substitutionGroup="ncllang:presentationRuleBase"/>
</schema>
```

10.16. NCL-CostFunction.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:BasicDescriptor="http://www.telemidia.puc-
rio.br/specs/xml/ncl/BasicDescriptor"
        xmlns:CostFunction="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CostFunction"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/CostFunction"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="costFunction" type="ncllang:costFunctionType"
substitutionGroup="ncllang:costFunction"/>
    <element name="costFunctionBase" type="ncllang:costFunctionBaseType"
substitutionGroup="ncllang:costFunctionBase"/>
```

```
    <element name="costFunctionParam" type="ncllang:costFunctionParamType"
substitutionGroup="ncllang:costFunctionParam"/>
</schema>
```

10.17. NCL-DescriptorControl.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:DescriptorControl="http://www.telemidia.puc-
rio.br/specs/xml/ncl/DescriptorControl"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/DescriptorControl"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <!-- import the definitions in the NCL namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="descriptorSwitch" type="ncllang:descriptorSwitchType"
substitutionGroup="ncllang:descriptorSwitch"/>
</schema>
```

10.18. NCL-interface.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- define the coords attribute -->
    <attribute name="coords" type="string"/>

    <!-- define the begin, end, dur attributes -->
    <attribute name="begin" type="string"/>
    <attribute name="end" type="string"/>
    <!-- <attribute name="dur" type="unsignedLong"/> -->

    <attribute name="anchorLabel" type="string"/>
```

```
<!-- define the text, position attributes -->
<attribute name="text" type="string"/>
<attribute name="position" type="unsignedLong"/>

<!-- define the first, last attributes -->
<attribute name="first" type="unsignedLong"/>
<attribute name="last" type="unsignedLong"/>

<!-- define the component, anchor attributes -->
<attribute name="component" type="string"/>
<attribute name="anchor" type="string"/>

<!-- define the component list attribute -->
<attribute name="componentList" type="IDREFS"/>

<!-- define the attribute name attribute -->
<!-- <attribute name="name" type="string"/> -->

<!-- define the TemporalAnchorAttrs attribute group -->
<attributeGroup name="TemporalAnchorAttrs">
    <attribute name="begin" type="string"/>
    <attribute name="end" type="string"/>
    <attribute name="dur" type="string"/>
    <attribute name="implicitDur" type="string"/>
</attributeGroup>

<!-- define the TextAnchorAttrs attribute group -->
<attributeGroup name="TextAnchorAttrs">
    <attribute name="text" type="string"/>
    <attribute name="position" type="unsignedLong"/>
</attributeGroup>

<!-- define the SampleAnchorAttrs attribute group -->
<attributeGroup name="SampleAnchorAttrs">
    <attribute name="first" type="unsignedLong"/>
    <attribute name="last" type="unsignedLong"/>
</attributeGroup>

<!-- define the CompositePortAttrs attribute group -->
<attributeGroup name="CompositePortAttrs">
    <attribute name="component" type="IDREF"/>
    <attribute name="port" type="string"/>
</attributeGroup>

<complexType name="anchorPrototype">
</complexType>

<complexType name="imgAnchorPrototype">
    <complexContent>
        <extension base="ncl:anchorPrototype">
            <attribute name="anchorLabel" type="string"/>
```

```
            <attribute name="coords" type="string"/>
        </extension>
    </complexContent>
</complexType>

<complexType name="audioAnchorPrototype">
    <complexContent>
        <extension base="ncl:anchorPrototype">
            <attribute name="anchorLabel" type="string"/>
            <attributeGroup ref="ncl:TemporalAnchorAttrs" />
            <attributeGroup ref="ncl:SampleAnchorAttrs" />
        </extension>
    </complexContent>
</complexType>

<complexType name="videoAnchorPrototype">
    <complexContent>
        <extension base="ncl:anchorPrototype">
            <attribute name="anchorLabel" type="string"/>
            <attributeGroup ref="ncl:TemporalAnchorAttrs" />
            <attribute name="coords" type="string"/>
            <attributeGroup ref="ncl:SampleAnchorAttrs" />
        </extension>
    </complexContent>
</complexType>

<complexType name="textAnchorPrototype">
    <complexContent>
        <extension base="ncl:anchorPrototype">
            <attribute name="anchorLabel" type="string"/>
            <attributeGroup ref="ncl:TextAnchorAttrs" />
        </extension>
    </complexContent>
</complexType>

<complexType name="compositeAnchorPrototype">
    <complexContent>
        <extension base="ncl:anchorPrototype">
            <attribute name="componentList" type="string"/>
        </extension>
    </complexContent>
</complexType>

<complexType name="compositePortPrototype">
    <complexContent>
        <extension base="ncl:anchorPrototype">
            <attribute name="anchorLabel" type="string"/>
            <attributeGroup ref="ncl:CompositePortAttrs" />
        </extension>
    </complexContent>
</complexType>
```

```
    <complexType name="componentAnchorPrototype">
        <complexContent>
            <extension base="ncl:anchorPrototype">
                <attribute name="coords" type="string"/>
                <attributeGroup ref="ncl:TemporalAnchorAttrs" />
                <attributeGroup ref="ncl:TextAnchorAttrs" />
                <attributeGroup ref="ncl:SampleAnchorAttrs" />
                <attribute name="anchorLabel" type="string"/>
            </extension>
        </complexContent>
    </complexType>

    <complexType name="attributeInterfacePrototype">
        <attribute name="name" type="string"/>
    </complexType>

    <complexType name="portSwitchPrototype">
    </complexType>

    <!-- declare global elements in this module -->
    <element name="area" type="ncllang:anchorType"
substitutionGroup="ncllang:area"/>

    <element name="compositeArea" type="ncllang:compositeAnchorType"
substitutionGroup="ncllang:compositeArea"/>
    <element name="port" type="ncllang:compositePortType"
substitutionGroup="ncllang:port"/>

    <element name="attribute" type="ncllang:attributeInterfaceType"
substitutionGroup="ncllang:attribute"/>

    <element name="portSwitch" type="ncllang:portSwitchType"
substitutionGroup="ncllang:portSwitch"/>

</schema>
```

10.19. NCL-Language.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
           xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        elementFormDefault="qualified">

    <!-- import the ncl namespaces -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
```

```
    <!-- ================================================================== -->
    <!-- CoreAttrs attribute group used on all NCL profile elements         -->
    <!-- ================================================================== -->
    <attributeGroup name="CoreAttrs">
        <attribute name="id" type="ID" />
    </attributeGroup>


    <!-- ================================================================== -->
    <!-- Structure Functionality                                            -->
    <!-- ================================================================== -->

    <!-- ================================================================== -->
    <!-- define the top down structure of an NCL language document.          -->
    <!-- ================================================================== -->

    <!-- top level ncl element and content model -->
    <element name="ncl" type="ncllang:nclType"/>
    <complexType name="nclType">
        <complexContent>
            <extension base="ncl:nclPrototype">
                <sequence>
                    <element ref="ncllang:head" minOccurs="0" maxOccurs="1"/>
                    <element ref="ncllang:body" minOccurs="1" maxOccurs="1"/>
                </sequence>
                <attributeGroup ref="ncllang:CoreAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- head element and content model -->
    <element name="head" type="ncllang:headType"/>
    <complexType name="headType">
        <complexContent>
            <extension base="ncl:headPrototype">
               <!--
               <sequence>
                  <element ref="ncllang:layout" minOccurs="0" maxOccurs="1"/>
                  <element ref="ncllang:descriptorBase" minOccurs="0"
maxOccurs="1"/>
                  <element ref="ncllang:costFunctionBase" minOccurs="0"
maxOccurs="1"/>
                  <element ref="ncllang:presentationRuleBase" minOccurs="0"
maxOccurs="1"/>
               </sequence>
               -->
               <choice minOccurs="0" maxOccurs="unbounded">
                    <group ref="ncllang:presentationRuleBaseGroup"/>
                    <group ref="ncllang:descriptorBaseGroup"/>
                    <group ref="ncllang:layoutGroup"/>
```

```
                <group ref="ncllang:costFunctionBaseGroup"/>
            </choice>
        </extension>
    </complexContent>
</complexType>

<!-- body element and content model -->
<element name="body" type="ncllang:bodyType"/>
<complexType name="bodyType">
    <complexContent>
        <extension base="ncl:bodyPrototype">
            <choice minOccurs="0" maxOccurs="unbounded">
                <group ref="ncllang:compositeInterfaceElementGroup"/>
                <group ref="ncllang:mediaContentGroup"/>
                <group ref="ncllang:compositionContentGroup"/>
                <group ref="ncllang:linkBaseElementGroup"/>
                <group ref="ncllang:contentControlGroup"/>
            </choice>
        </extension>
    </complexContent>
</complexType>

<group name="contentControlGroup">
    <choice>
        <element ref="ncllang:switch"/>
    </choice>
</group>

<!-- ================================================================== -->
<!-- Layout Functionality                                               -->
<!-- ================================================================== -->

<!-- layout element and content model -->
<element name="layout" type="ncllang:layoutType"/>
<complexType name="layoutType">
    <complexContent>
        <extension base="ncl:layoutPrototype">
            <choice maxOccurs="unbounded">
                <group ref="ncllang:topLayoutGroup"/>
            </choice>
        </extension>
    </complexContent>
</complexType>

<group name="layoutGroup">
    <choice>
        <element ref="ncllang:layout"/>
    </choice>
</group>

<!-- topLayout element and content model -->
```

```
    <element name="topLayout" type="ncllang:topLayoutType"/>
    <complexType name="topLayoutType">
        <complexContent>
           <extension base="ncl:topLayoutPrototype">
                <choice maxOccurs="unbounded">
                    <group ref="ncllang:regionGroup"/>
                </choice>
                <attributeGroup ref="ncllang:CoreAttrs"/>
            </extension>
       </complexContent>
    </complexType>

    <!-- toplayout groups -->
    <group name="topLayoutGroup">
        <choice>
            <element ref="ncllang:topLayout"/>
        </choice>
    </group>


    <!-- region element and content model -->
    <element name="region" type="ncllang:regionType"/>

    <complexType name="regionType">
        <complexContent>
            <extension base="ncl:regionPrototype">
               <!--
                <sequence>
                    <element name="region" type="ncllang:regionType" minOccurs="0"
maxOccurs="unbounded"/>
                </sequence>
                -->
                <choice minOccurs="0" maxOccurs="unbounded">
                    <group ref="ncllang:regionGroup"/>
                </choice>
                <attributeGroup ref="ncllang:CoreAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- region groups -->
    <group name="regionGroup">
        <choice>
            <element ref="ncllang:region"/>
        </choice>
    </group>

    <!-- ================================================================= -->
    <!-- Presentation Specification Functionality                          -->
    <!-- ================================================================= -->
```

```
    <!-- descriptor element and content model -->
    <element name="descriptor" type="ncllang:descriptorType"/>
    <complexType name="descriptorType">
        <complexContent>
            <extension base="ncl:descriptorPrototype">
                <sequence>
                    <element ref="ncllang:descriptorParam" minOccurs="0"
maxOccurs="unbounded" />
                </sequence>
                <attributeGroup ref="ncllang:CoreAttrs"/>
                <attributeGroup ref="ncl:regionAttrs"/>
                <attributeGroup ref="ncl:TimingAttrs"/>
                <attributeGroup ref="ncl:systemTestAttrs"/>
                <attributeGroup ref="ncl:costFunctionAttrs"/>
                <attributeGroup ref="ncl:explicitDurAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <element name="descriptorParam" type="ncllang:descriptorParamType"/>
    <complexType name="descriptorParamType">
        <complexContent>
            <extension base="ncl:descriptorParamPrototype">
            </extension>
        </complexContent>
    </complexType>

    <!-- descriptor groups -->
    <group name="descriptorGroup">
        <choice>
            <element ref="ncllang:descriptor"/>
        </choice>
    </group>

    <!-- descriptorBase element and content model -->
    <element name="descriptorBase" type="ncllang:descriptorBaseType"/>
    <complexType name="descriptorBaseType">
        <complexContent>
            <extension base="ncl:descriptorBasePrototype">
                <choice maxOccurs="unbounded">
                    <group ref="ncllang:descriptorGroup"/>
                    <group ref="ncllang:descriptorSwitchGroup"/>
                </choice>
            </extension>
        </complexContent>
    </complexType>

    <!-- descriptorBase groups -->
    <group name="descriptorBaseGroup">
        <choice>
            <element ref="ncllang:descriptorBase"/>
```

```
        </choice>
    </group>

    <!-- componentPresentation element and content model -->
    <element name="componentPresentation"
type="ncllang:componentPresentationType"/>
    <complexType name="componentPresentationType">
        <complexContent>
            <extension base="ncl:componentPresentationPrototype">
            </extension>
        </complexContent>
    </complexType>

    <!-- componentPresentation groups -->
    <group name="componentPresentationGroup">
        <choice>
            <element ref="ncllang:componentPresentation"/>
        </choice>
    </group>

    <!-- bindDescriptor element and content model -->
    <element name="bindDescriptor" type="ncllang:bindDescriptorType"/>
    <complexType name="bindDescriptorType">
        <complexContent>
            <extension base="ncl:bindDescriptorPrototype">
            </extension>
        </complexContent>
    </complexType>

    <!-- bindDescriptor groups -->
    <group name="bindDescriptorGroup">
        <choice>
            <element ref="ncllang:bindDescriptor"/>
        </choice>
    </group>
    <!-- ================================================================= -->
    <!-- Component Functionality                                           -->
    <!-- ================================================================= -->

    <!-- media elements and content model -->
    <element name="text" type="ncllang:mediaType"/>
    <element name="img" type="ncllang:mediaType"/>
    <element name="audio" type="ncllang:mediaType"/>
    <element name="animation" type="ncllang:mediaType"/>
    <element name="video" type="ncllang:mediaType"/>
    <element name="textstream" type="ncllang:mediaType"/>
    <element name="ref" type="ncllang:mediaType"/>

    <complexType name="mediaType">
        <complexContent>
            <extension base="ncl:mediaPrototype">
```

```
                    <choice minOccurs="0" maxOccurs="unbounded">
                <group ref="ncllang:mediaInterfaceElementGroup"/>
            </choice>
            <attributeGroup ref="ncllang:CoreAttrs"/>
            <attributeGroup ref="ncl:descriptorAttrs"/>
            <attributeGroup ref="ncl:CompositeTemplateUseAttrs"/>
            <attributeGroup ref="ncl:systemTestAttrs"/>
            <attributeGroup ref="ncl:implicitDurAttrs"/>
        </extension>
    </complexContent>
</complexType>


<!-- media groups -->
<group name="mediaContentGroup">
    <choice>
        <element ref="ncllang:text"/>
        <element ref="ncllang:img"/>
        <element ref="ncllang:audio"/>
        <element ref="ncllang:animation"/>
        <element ref="ncllang:video"/>
        <element ref="ncllang:textstream"/>
        <element ref="ncllang:ref"/>
    </choice>
</group>

<!-- ================================================================== -->
<!-- composition element                                                -->
<!-- ================================================================== -->

<!-- composition elements and content model -->
<element name="composition" type="ncllang:compositionType"/>

<complexType name="compositionType">
    <complexContent>
        <extension base="ncl:compositionPrototype">
            <choice minOccurs="0" maxOccurs="unbounded">
                <group ref="ncllang:compositeInterfaceElementGroup"/>
                <group ref="ncllang:componentPresentationGroup"/>
                <group ref="ncllang:bindDescriptorGroup"/>
                <group ref="ncllang:mediaContentGroup"/>
                <group ref="ncllang:compositionContentGroup"/>
                <group ref="ncllang:linkBaseElementGroup"/>
                <group ref="ncllang:contentControlGroup"/>
            </choice>
            <attributeGroup ref="ncllang:CoreAttrs"/>
            <attributeGroup ref="ncl:descriptorAttrs"/>
            <attributeGroup ref="ncl:systemTestAttrs"/>
            <attributeGroup ref="ncl:CompositeTemplateUseAttrs"/>
        </extension>
    </complexContent>
```

```
    </complexType>

    <!-- composition component groups -->
    <group name="compositionContentGroup">
        <choice>
            <element ref="ncllang:composition"/>
        </choice>
    </group>

    <!-- ================================================================= -->
    <!-- Interface Functionality                                           -->
    <!-- ================================================================= -->

    <!-- area elements and content model -->
    <element name="area" type="ncllang:anchorType"/>

    <complexType name="anchorType">
        <complexContent>
            <extension base="ncl:componentAnchorPrototype">
                <attributeGroup ref="ncllang:CoreAttrs"/>
                <attributeGroup ref="ncl:CompositeTemplateUseAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- attribute elements and content model -->
    <element name="attribute" type="ncllang:attributeInterfaceType"/>

    <complexType name="attributeInterfaceType">
        <complexContent>
            <extension base="ncl:attributeInterfacePrototype">
                <attributeGroup ref="ncllang:CoreAttrs"/>
                <attributeGroup ref="ncl:CompositeTemplateUseAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- media interface element groups -->
    <group name="mediaInterfaceElementGroup">
        <choice>
            <element ref="ncllang:area"/>
            <element ref="ncllang:attribute"/>
        </choice>
    </group>

    <!-- compositeArea elements and content model -->
    <element name="compositeArea" type="ncllang:compositeAnchorType"/>

    <complexType name="compositeAnchorType">
        <complexContent>
            <extension base="ncl:compositeAnchorPrototype">
```

```
            <attributeGroup ref="ncllang:CoreAttrs"/>
            <attributeGroup ref="ncl:CompositeTemplateUseAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- port elements and content model -->
<element name="port" type="ncllang:compositePortType"/>

<complexType name="compositePortType">
    <complexContent>
        <extension base="ncl:compositePortPrototype">
            <attributeGroup ref="ncllang:CoreAttrs"/>
            <attributeGroup ref="ncl:CompositeTemplateUseAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- composite interface element groups -->
<group name="compositeInterfaceElementGroup">
    <choice>
        <element ref="ncllang:compositeArea"/>
        <element ref="ncllang:port"/>
    </choice>
</group>

<!-- portSwitch elements and content model -->
<element name="portSwitch" type="ncllang:portSwitchType"/>

<complexType name="portSwitchType">
    <complexContent>
        <extension base="ncl:portSwitchPrototype">
            <attributeGroup ref="ncllang:CoreAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- switch interface element groups -->
<group name="switchInterfaceElementGroup">
    <choice>
        <element ref="ncllang:port"/>
        <element ref="ncllang:portSwitch"/>
    </choice>
</group>

<!-- ================================================================= -->
<!-- Linking Functionality                                             -->
<!-- ================================================================= -->

<!-- bind element and content model -->
<element name="bind" type="ncllang:bindType"/>
```

```
<complexType name="bindType">
    <complexContent>
        <extension base="ncl:bindPrototype">
            <attributeGroup ref="ncl:descriptorAttrs"/>
        </extension>
    </complexContent>
</complexType>

<group name="bindGroup">
    <choice>
        <element ref="ncllang:bind"/>
    </choice>
</group>

<!-- linkbase element and content model -->
<element name="linkBase" type="ncllang:linkBaseType"/>
<complexType name="linkBaseType">
    <complexContent>
        <extension base="ncl:linkBasePrototype">
            <choice minOccurs="1" maxOccurs="unbounded">
                <group ref="ncllang:lrefGroup"/>
                <group ref="ncllang:linkGroup"/>
            </choice>
            <attributeGroup ref="ncllang:CoreAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- lref element and content model -->
<element name="lref" type="ncllang:lrefType"/>
<complexType name="lrefType">
    <complexContent>
        <extension base="ncl:lrefPrototype">
            <attributeGroup ref="ncllang:CoreAttrs"/>
        </extension>
    </complexContent>
</complexType>

<group name="lrefGroup">
    <choice>
        <element ref="ncllang:lref"/>
    </choice>
</group>

<group name="linkGroup">
    <choice>
        <element ref="ncllang:link"/>
        <!-- <element ref="ncllang:lref"/> -->
    </choice>
</group>
```

```
    <!-- linkbase element groups -->
    <group name="linkBaseElementGroup">
        <choice>
            <element ref="ncllang:linkBase"/>
        </choice>
    </group>

    <!-- param element and content model -->
    <element name="param" type="ncllang:paramType"/>
    <complexType name="paramType">
        <complexContent>
            <extension base="ncl:paramPrototype">
                <attributeGroup ref="ncl:descriptorAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <group name="paramGroup">
        <choice>
            <element ref="ncllang:param"/>
        </choice>
    </group>

    <!-- link element and content model -->
    <element name="link" type="ncllang:linkType"/>
    <complexType name="linkType">
        <complexContent>
            <extension base="ncl:linkPrototype">
                <choice maxOccurs="unbounded" minOccurs="0">
                  <group ref="ncllang:bindGroup"/>
                  <group ref="ncllang:paramGroup"/>
                </choice>
                      <attributeGroup ref="ncllang:CoreAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- ================================================================= -->
    <!-- Connector Functionality                                           -->
    <!-- ================================================================= -->

           <element name="compositeConnector"
type="ncllang:compositeConnectorType"/>
           <complexType name="compositeConnectorType">
               <complexContent>
                   <extension base="ncl:compositeConnectorPrototype">
                       <sequence>
                           <element ref="ncllang:role" minOccurs="2"
maxOccurs="unbounded" />
                           <element ref="ncllang:glue" maxOccurs="1" />
                       </sequence>
```

```
                    <attributeGroup ref="ncllang:CoreAttrs"/>
                </extension>
            </complexContent>
        </complexType>

<!-- role element and content model (for composite connectors) -->
<element name="role" type="ncllang:compositeRoleType"/>
<complexType name="compositeRoleType">
    <complexContent>
        <extension base="ncl:compositeRolePrototype">
        </extension>
    </complexContent>
</complexType>

<!-- glue element and content model (for composite connectors) -->
<element name="glue" type="ncllang:compositeGlueType"/>
<complexType name="compositeGlueType">
    <complexContent>
        <extension base="ncl:compositeGluePrototype">
           <choice minOccurs="0" maxOccurs="unbounded">
                <group ref="ncllang:mediaContentGroup"/>
                <group ref="ncllang:compositionContentGroup"/>
                <group ref="ncllang:linkBaseElementGroup"/>
                <element ref="ncllang:partialLinkBase"/>
            </choice>
        </extension>
    </complexContent>
</complexType>

<element name="partialLinkBase" type="ncllang:partialLinkBaseType"/>

<complexType name="partialLinkBaseType">
    <complexContent>
        <extension base="ncl:partialLinkBasePrototype">
            <sequence>
                <element ref="ncllang:link" maxOccurs="unbounded" />
            </sequence>
        </extension>
    </complexContent>
</complexType>

<!-- ================================================================== -->
<!-- Presentation Control Functionality                                 -->
<!-- ================================================================== -->

<!-- switch element and content model -->
<element name="switch" type="ncllang:switchType"/>
<complexType name="switchType">
    <complexContent>
        <extension base="ncl:switchPrototype">
            <choice maxOccurs="unbounded">
```

```
                <group ref="ncllang:switchInterfaceElementGroup"/>
                <group ref="ncllang:mediaContentGroup"/>
                <group ref="ncllang:compositionContentGroup"/>
                <group ref="ncllang:contentControlGroup"/>
                <group ref="ncllang:bindRuleGroup"/>
            </choice>
            <attributeGroup ref="ncllang:CoreAttrs"/>
            <attributeGroup ref="ncl:systemTestAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- descriptorSwitch element and content model -->
<element name="descriptorSwitch" type="ncllang:descriptorSwitchType"/>
<complexType name="descriptorSwitchType">
    <complexContent>
        <extension base="ncl:descriptorSwitchPrototype">
            <choice minOccurs="0" maxOccurs="unbounded">
                <group ref="ncllang:descriptorGroup"/>
                <group ref="ncllang:bindRuleGroup"/>
            </choice>
            <attributeGroup ref="ncllang:CoreAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- descriptorSwitch groups -->
<group name="descriptorSwitchGroup">
    <choice>
        <element ref="ncllang:descriptorSwitch"/>
    </choice>
</group>

<!-- bindRule element and content model -->
<element name="bindRule" type="ncllang:bindRuleType"/>
<complexType name="bindRuleType">
    <complexContent>
        <extension base="ncl:bindRulePrototype">
            <attributeGroup ref="ncllang:CoreAttrs"/>
        </extension>
    </complexContent>
</complexType>

<group name="bindRuleGroup">
    <choice>
        <element ref="ncllang:bindRule"/>
    </choice>
</group>


<!-- ================================================================= -->
```

```
    <!-- Presentation Rule Base Functionality                              -->
    <!-- ================================================================= -->

    <!-- presentationRule element and content model -->
    <element name="presentationRule" type="ncllang:presentationRuleType"/>
    <complexType name="presentationRuleType">
        <complexContent>
            <extension base="ncl:presentationRulePrototype">
                <attributeGroup ref="ncllang:CoreAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <element name="compositePresentationRule"
type="ncllang:compositePresentationRuleType"/>
    <complexType name="compositePresentationRuleType">
        <complexContent>
            <extension base="ncl:compositePresentationRulePrototype">
                       <choice maxOccurs="unbounded">
                    <group ref="ncllang:presentationRuleGroup"/>
                    <group ref="ncllang:compositePresentationRuleGroup"/>
                       </choice>
                <attributeGroup ref="ncllang:CoreAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- presentationRuleBase element and content model -->
    <element name="presentationRuleBase" type="ncllang:presentationRuleBaseType"/>
    <complexType name="presentationRuleBaseType">
        <complexContent>
            <extension base="ncl:presentationRuleBasePrototype">
                <choice maxOccurs="unbounded">
                    <group ref="ncllang:presentationRuleGroup"/>
                    <group ref="ncllang:compositePresentationRuleGroup"/>
                </choice>
            </extension>
        </complexContent>
    </complexType>

    <group name="presentationRuleBaseGroup">
        <choice>
            <element ref="ncllang:presentationRuleBase"/>
        </choice>
    </group>

    <!-- presentationRuleGroup groups -->
    <group name="presentationRuleGroup">
        <choice>
            <element ref="ncllang:presentationRule"/>
        </choice>
```

```
    </group>

    <group name="compositePresentationRuleGroup">
        <choice>
            <element ref="ncllang:compositePresentationRule"/>
        </choice>
    </group>

    <!-- ================================================================= -->
    <!-- Cost Function Base Functionality                                  -->
    <!-- ================================================================= -->

    <!-- costFunction element and content model -->
    <element name="costFunction" type="ncllang:costFunctionType"/>
    <complexType name="costFunctionType">
        <complexContent>
            <extension base="ncl:costFunctionPrototype">
                <sequence>
                    <element ref="ncllang:costFunctionParam" minOccurs="0"
maxOccurs="unbounded" />
                </sequence>
                <attributeGroup ref="ncllang:CoreAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- costFunction groups -->
    <group name="costFunctionGroup">
        <choice>
            <element ref="ncllang:costFunction"/>
        </choice>
    </group>

    <element name="costFunctionParam" type="ncllang:costFunctionParamType"/>
    <complexType name="costFunctionParamType">
        <complexContent>
            <extension base="ncl:costFunctionParamPrototype">
            </extension>
        </complexContent>
    </complexType>

    <!-- costFunctionBase element and content model -->
    <element name="costFunctionBase" type="ncllang:costFunctionBaseType"/>
    <complexType name="costFunctionBaseType">
        <complexContent>
            <extension base="ncl:costFunctionBasePrototype">
                <choice minOccurs="0" maxOccurs="unbounded">
                    <group ref="ncllang:costFunctionGroup"/>
                </choice>
            </extension>
        </complexContent>
```

```
    </complexType>

    <!-- costFunctionBase groups -->
    <group name="costFunctionBaseGroup">
        <choice>
            <element ref="ncllang:costFunctionBase"/>
        </choice>
    </group>
</schema>
```

10.20. NCL-layout.xsd

```
schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- utility type for fit attribute values -->
    <simpleType name="fitAttributeType">
        <restriction base="string">
            <enumeration value="fill"/>
            <enumeration value="hidden"/>
            <enumeration value="meet"/>
            <enumeration value="scroll"/>
            <enumeration value="slice"/>
        </restriction>
    </simpleType>

    <!-- define the layout element prototype -->
    <complexType name="layoutPrototype">
        <attribute name="type" type="string" use="optional"  default="text/ncl-
layout"/>
        <attribute name="src" type="anyURI" use="optional" />
    </complexType>

    <!-- define the Layout Component element prototype -->
    <complexType name="LayoutComponentPrototype">
        <attribute name="title" type="string" use="optional" />
        <attribute name="backgroundColor" type="string" use="optional" />
        <!-- novo nome equivalente para backgroundColor -->
        <attribute name="background" type="string" use="optional" />
        <attribute name="height" type="string" use="optional" />
        <attribute name="left" type="string" use="optional"  />
        <attribute name="top" type="string" use="optional"  />
        <attribute name="width" type="string" use="optional"  />
```

```
        <attribute name="zIndex" type="integer" use="optional" />
        <attribute name="visible" type="boolean" use="optional" />

        <attribute name="close" use="optional"  default="onRequest">
            <simpleType>
                <restriction base="string">
                    <enumeration value="onRequest"/>
                    <enumeration value="whenNotActive"/>
                </restriction>
            </simpleType>
        </attribute>

        <attribute name="open" use="optional"  default="onStart">
            <simpleType>
                <restriction base="string">
                    <enumeration value="onStart"/>
                    <enumeration value="whenActive"/>
                </restriction>
            </simpleType>
        </attribute>

    </complexType>

    <!-- define the topLayout element prototype -->
    <complexType name="topLayoutPrototype">
        <complexContent>
            <extension base="ncl:LayoutComponentPrototype">
                <attribute name="movable" type="boolean" use="optional"  />
                <attribute name="resizable" type="boolean" use="optional"  />
            </extension>
        </complexContent>
    </complexType>

    <!-- define the region element prototype -->
    <complexType name="regionPrototype">
        <complexContent>
            <extension base="ncl:LayoutComponentPrototype">
                <attribute name="fit" use="optional"  default="hidden"
type="ncl:fitAttributeType"/>
                <attribute name="showBackground" use="optional"  default="always">
                   <simpleType>
                      <restriction base="string">
                         <enumeration value="always"/>
                         <enumeration value="whenActive"/>
                      </restriction>
                   </simpleType>
                </attribute>
            </extension>
        </complexContent>
    </complexType>
```

```
    <!-- define the global region attribute -->
    <attribute name="region" type="IDREF"/>

    <!-- define the region attributeGroup -->
    <attributeGroup name="regionAttrs">
        <attribute name="region" type="IDREF" use="optional"/>
    </attributeGroup>

    <!-- define the global layout elements -->
    <element name="layout" type="ncllang:layoutType"
substitutionGroup="ncllang:layout"/>
    <element name="topLayout" type="ncllang:topLayoutType"
substitutionGroup="ncllang:topLayout"/>
    <element name="region" type="ncllang:regionType"
substitutionGroup="ncllang:region"/>

</schema>
```

10.21. NCL-link.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>



    <attribute name="xconnector" type="anyURI"/>
    <attribute name="name" type="string" />
    <attribute name="value" type="anySimpleType"/>
    <attribute name="role" type="string" />
    <!-- <attribute name="component" type="anyURI" /> -->
    <attribute name="port" type="string" />
    <!-- <attribute name="src" type="anyURI" /> -->

    <complexType name="linkPrototype">
        <attribute name="xconnector" type="anyURI" use="required"/>
    </complexType>

    <complexType name="paramPrototype">
         <attribute name="name" type="string" use="required"/>
         <attribute name="value" type="anySimpleType" use="required"/>
    </complexType>

    <complexType name="bindPrototype">
```

```
        <attribute name="role" type="string" use="required"/>
        <attribute name="component" type="anyURI" use="required"/>
        <attribute name="port" type="string" />
        <attribute name="descriptor" type="IDREF" />
    </complexType>

    <complexType name="lrefPrototype">
        <attribute name="src" type="anyURI" use="required"/>
    </complexType>

    <complexType name="linkBasePrototype">
    </complexType>

    <element name="param" type="ncllang:paramType"
substitutionGroup="ncllang:param"/>
    <element name="bind" type="ncllang:bindType"
substitutionGroup="ncllang:bind"/>

    <element name="link" type="ncllang:linkType"
substitutionGroup="ncllang:link"/>
    <element name="linkBase" type="ncllang:linkBaseType"
substitutionGroup="ncllang:linkBase"/>
    <element name="lref" type="ncllang:lrefType"
substitutionGroup="ncllang:lref"/>

</schema>
```

10.22. NCL-Linking.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:Linking="http://www.telemidia.puc-rio.br/specs/xml/ncl/Linking"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Linking"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>

    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <element name="param" type="ncllang:paramType"
substitutionGroup="ncllang:param"/>
    <element name="bind" type="ncllang:bindType"
substitutionGroup="ncllang:bind"/>

    <element name="link" type="ncllang:linkType"
```

```
substitutionGroup="ncllang:link"/>
    <element name="linkBase" type="ncllang:linkBaseType"
substitutionGroup="ncllang:linkBase"/>
    <element name="lref" type="ncllang:lrefType"
substitutionGroup="ncllang:lref"/>

    <!-- declare global attributes in this module -->
    <attribute name="xconnector" type="anyURI"/>
    <attribute name="name" type="string" />
    <attribute name="value" type="anySimpleType"/>
    <attribute name="role" type="string" />
    <attribute name="component" type="anyURI" />
    <attribute name="port" type="string" />
    <attribute name="src" type="anyURI" />

</schema>
```

10.23. NCL-MediaInterface.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:MediaInterface="http://www.telemidia.puc-
rio.br/specs/xml/ncl/MediaInterface"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/MediaInterface"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="area" type="ncllang:anchorType"
substitutionGroup="ncllang:area"/>

    <!-- declare global attributes in this module -->
    <attribute name="coords" type="string"/>
    <attribute name="begin" type="string"/>
    <attribute name="end" type="string"/>
    <attribute name="dur" type="unsignedLong"/>
    <attribute name="text" type="string"/>
    <attribute name="position" type="unsignedLong"/>
    <attribute name="first" type="unsignedLong"/>
    <attribute name="last" type="unsignedLong"/>
    <attribute name="implicitDur" type="string"/>
</schema>
```

10.24. NCL-presentation.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- define the descriptor global attribute -->
    <attribute name="descriptor" type="IDREF"/>

    <!-- define the descriptor attributeGroup -->
    <attributeGroup name="descriptorAttrs">
        <attribute name="descriptor" type="IDREF" use="optional"/>
    </attributeGroup>

    <!-- define the audio descriptor attribute -->
    <attribute name="soundLevel" type="string"/>
    <attribute name="balanceLevel" type="string"/>
    <attribute name="trebleLevel" type="string"/>
    <attribute name="bassLevel" type="string"/>

    <!-- define the soundLevel attributeGroup -->
    <attributeGroup name="AudioDescriptorAttrs">
        <attribute name="soundLevel" type="string" use="optional"/>
        <attribute name="balanceLevel" type="string" use="optional"/>
        <attribute name="trebleLevel" type="string" use="optional"/>
        <attribute name="bassLevel" type="string" use="optional"/>
    </attributeGroup>

    <complexType name="descriptorPrototype">
        <attribute name="player" type="string" use="optional"/>
        <attribute name="enableTimeBar" use="optional">
          <simpleType>
             <restriction base="string">
                <enumeration value="on"/>
                <enumeration value="off"/>
            </restriction>
          </simpleType>
        </attribute>
        <attribute name="style" type="anyURI" use="optional"/>
        <attributeGroup ref="ncl:AudioDescriptorAttrs" />
        <attribute name="nodeRule" type="IDREF" use="optional"/>
    </complexType>
```

```
    <complexType name="descriptorBasePrototype">
    </complexType>

    <complexType name="componentPresentationPrototype">
        <attribute name="component" type="IDREF" use="required"/>
        <attribute name="descriptor" type="IDREF" use="required"/>
    </complexType>

    <complexType name="bindDescriptorPrototype">
        <attribute name="component" type="IDREF" use="required"/>
        <attribute name="descriptor" type="IDREF" use="required"/>
    </complexType>

    <complexType name="descriptorParamPrototype">
         <attribute name="name" type="string" use="required"/>
         <attribute name="value" type="anySimpleType" use="required"/>
    </complexType>

    <!-- declare global elements in this module -->
    <element name="descriptor" type="ncllang:descriptorType"
substitutionGroup="ncllang:descriptor"/>
    <element name="descriptorParam" type="ncllang:descriptorParamType"
substitutionGroup="ncllang:descriptorParam"/>
    <element name="descriptorBase" type="ncllang:descriptorBaseType"
substitutionGroup="ncllang:descriptorBase"/>
    <element name="componentPresentation" type="ncllang:componentPresentationType"
substitutionGroup="ncllang:componentPresentation"/>
    <element name="bindDescriptor" type="ncllang:bindDescriptorType"
substitutionGroup="ncllang:bindDescriptor"/>
</schema>
```

10.25. NCL-struct.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- define the structure module attribute group -->
    <attributeGroup name="structureModuleAttrs">
    </attributeGroup>

    <!-- define the ncl element prototype -->
    <complexType name="nclPrototype">
    </complexType>
```

```
    <!-- define the head element prototype -->
    <complexType name="headPrototype">
    </complexType>

    <!-- define the body element prototype -->
    <complexType name="bodyPrototype">
    </complexType>

    <!-- declare global elements -->
    <element name="ncl" type="ncllang:nclType" substitutionGroup="ncllang:ncl"/>
    <element name="head" type="ncllang:headType"
substitutionGroup="ncllang:head"/>
    <element name="body" type="ncllang:bodyType"
substitutionGroup="ncllang:body"/>

</schema>
```

10.26. NCL-Structure.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:Structure="http://www.telemidia.puc-rio.br/specs/xml/ncl/Structure"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Structure"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="ncl" type="ncllang:nclType" substitutionGroup="ncllang:ncl"/>
    <element name="head" type="ncllang:headType"
substitutionGroup="ncllang:head"/>
    <element name="body" type="ncllang:bodyType"
substitutionGroup="ncllang:body"/>
</schema>
```

10.27. NCL-SwitchInterface.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:SwitchInterface="http://www.telemidia.puc-
rio.br/specs/xml/ncl/SwitchInterface"
```

```
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/SwitchInterface"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="portSwitch" type="ncllang:portSwitchType"
substitutionGroup="ncllang:portSwitch"/>
</schema>
```

10.28. NCL-TestRules.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:TestRules="http://www.telemidia.puc-rio.br/specs/xml/ncl/TestRules"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/TestRules"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="presentationRule" type="ncllang:presentationRuleType"
substitutionGroup="ncllang:presentationRule"/>
    <element name="presentationRuleBase" type="ncllang:presentationRuleBaseType"
substitutionGroup="ncllang:presentationRuleBase"/>
    <element name="compositePresentationRule"
type="ncllang:compositePresentationRuleType"
substitutionGroup="ncllang:compositePresentationRule"/>
</schema>
```

10.29. NCL-timing.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >
```

```
   <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL-language.xsd"/>

   <!-- define the dur, min, max timing attributes -->
   <attribute name="dur" type="string"/>
   <attribute name="min" type="string"/>
   <attribute name="max" type="string"/>
   <attribute name="implicitDur" type="string"/>

   <!-- define the TimingAttrs attribute group -->
   <attributeGroup name="TimingAttrs">
       <attribute name="dur" type="string" use="optional"/>
       <attribute name="min" type="string" use="optional"/>
       <attribute name="max" type="string" use="optional"/>
       <attribute name="implicitDur" type="string" use="optional"/>
   </attributeGroup>

   <!-- declare global attributes in this module -->
   <attribute name="costFunction" type="IDREF"/>

   <!-- define the costFunctionAttrs attribute group -->
      <attributeGroup name="costFunctionAttrs">
      <attribute name="costFunction" type="IDREF" use="optional"/>
   </attributeGroup>

   <!-- define the explicitDur attribute group -->
      <attributeGroup name="explicitDurAttrs">
      <attribute name="explicitDur" type="string" use="optional"/>
   </attributeGroup>

   <!-- define the implicitDur attribute group -->
      <attributeGroup name="implicitDurAttrs">
      <attribute name="implicitDur" type="string" use="optional"/>
   </attributeGroup>

   <complexType name="costFunctionPrototype">
       <!--<attribute name="type" type="string" use="required"/> -->
       <attribute name="type" type="string" use="optional"/>
       <attribute name="ref" type="string" use="optional"/>
       <attribute name="deltaShrink" type="string" use="optional"/>
       <attribute name="deltaStretch" type="string" use="optional"/>
       <attribute name="minDurCost" type="string" use="optional"/>
       <attribute name="maxDurCost" type="string" use="optional"/>
   </complexType>

   <complexType name="costFunctionBasePrototype">
   </complexType>

   <complexType name="costFunctionParamPrototype">
        <attribute name="name" type="string" use="required"/>
```

```
        <attribute name="value" type="anySimpleType" use="required"/>
    </complexType>

    <!-- declare global elements in this module -->
    <element name="costFunction" type="ncllang:costFunctionType"
substitutionGroup="ncllang:costFunction"/>
    <element name="costFunctionBase" type="ncllang:costFunctionBaseType"
substitutionGroup="ncllang:costFunctionBase"/>
    <element name="costFunctionParam" type="ncllang:costFunctionParamType"
substitutionGroup="ncllang:costFunctionParam"/>
</schema>
```

10.30. NCL-XTemplateUse.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:ncl="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
        xmlns:ncllang="http://www.telemidia.puc-rio.br/specs/xml/ncl/Language"
        xmlns:TemplateUse="http://www.telemidia.puc-
rio.br/specs/xml/ncl/TemplateUse"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/ncl/TemplateUse"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/ncl/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/NCL21.xsd"/>

    <!-- declare global attributes in this module -->
    <attribute name="xtemplate" type="anyURI"/>
    <attribute name="label" type="string"/>
</schema>
```

11
Apêndice C

Especificação da linguagem XConnector 2.1.

11.1.
XConnector21.xsd

```
<schema
xmlns="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/XConnector/"
xmlns:xconnector="http://www.telemidia.puc-rio.br/specs/xml/XConnector/"
elementFormDefault="qualified" attributeFormDefault="unqualified">

<complexType name="HypermediaConnector" abstract="true">
   <sequence>
      <element name="param" type="xconnector:ParameterType" minOccurs="0"
maxOccurs="unbounded"/>
   </sequence>
   <attribute name="id" type="ID" use="required"/>
   <attribute name="name" type="string"/>
   <attribute name="description" type="string"/>
</complexType>

<complexType name="ParameterType" >
   <attribute name="name" type="string" use="required"/>
   <attribute name="type" type="string" use="required"/>
</complexType>

<complexType name="CausalHypermediaConnector">
   <complexContent>
      <extension base="xconnector:HypermediaConnector">
         <sequence>
            <choice maxOccurs="unbounded">
               <element name="conditionRole" type="xconnector:ConditionRole"/>
               <element name="propertyRole" type="xconnector:PropertyRole" />
            </choice>
            <element name="actionRole" type="xconnector:ActionRole"
maxOccurs="unbounded"/>
            <element name="causalGlue" type="xconnector:CausalGlue"/>
         </sequence>
      </extension>
   </complexContent>
</complexType>
```

```
<complexType name="ConstraintHypermediaConnector">
   <complexContent>
      <extension base="xconnector:HypermediaConnector">
         <sequence>
            <element name="propertyRole" type="xconnector:PropertyRole"
minOccurs="2" maxOccurs="unbounded"/>
            <element name="constraintGlue" type="xconnector:ConstraintGlue"/>
         </sequence>
      </extension>
   </complexContent>
</complexType>

<complexType name="Role" abstract="true">
   <attribute name="id" type="string" use="required"/>
   <attribute name="eventType" type="xconnector:EventType" use="required"/>
   <attribute name="attributeName" type="string" />
   <attributeGroup ref="xconnector:Cardinality"/>
</complexType>

<complexType name="ActionRole">
   <complexContent>
      <extension base="xconnector:Role">
         <attribute name="actionType" type="xconnector:SimpleAction"
use="required"/>
         <attribute name="show" type="xconnector:ShowType" default="new"/>
         <attribute name="delay" type="xconnector:unsignedLongParamUnion"
default="0"/>
         <attribute name="repeat" type="xconnector:repeatUnion" default="0"/>
         <attribute name="delayBetweenRep"
type="xconnector:unsignedLongParamUnion" default="0"/>
         <attribute name="initialValue" type="anySimpleType"/>
         <attribute name="finalValue" type="anySimpleType"/>
         <attribute name="duration" type="xconnector:unsignedLongParamUnion"
default="0"/>
      </extension>
   </complexContent>
</complexType>

<simpleType name="ShowType">
   <restriction base="string">
        <enumeration value="embed" />
        <enumeration value="replace" />
        <enumeration value="new" />
   </restriction>
</simpleType>

<attributeGroup name="Cardinality">
   <attribute name="min" type="positiveInteger" default="1"/>
   <attribute name="max" type="xconnector:maxUnion" default="1"/>
</attributeGroup >
```

```
<simpleType name="unboundedString">
   <restriction base="string">
      <pattern value="unbounded"/>
   </restriction>
</simpleType>

<simpleType name="unsignedLongParamUnion">
   <union memberTypes="unsignedLong string"/>
</simpleType>

<simpleType name="maxUnion">
   <union memberTypes="positiveInteger xconnector:unboundedString"/>
</simpleType>

<simpleType name="repeatUnion">
   <union memberTypes="nonNegativeInteger xconnector:unboundedString string"/>
</simpleType>

<simpleType name="EventType">
   <restriction base="string">
        <enumeration value="presentation" />
        <enumeration value="mouseClick" />
        <enumeration value="attribution" />
        <enumeration value="mouseOver" />
        <enumeration value="prefetch" />
        <enumeration value="focus" />
   </restriction>
</simpleType>

<simpleType name="SimpleAction">
   <restriction base="string">
      <enumeration value="start" />
      <enumeration value="stop" />
      <enumeration value="pause" />
      <enumeration value="resume" />
      <enumeration value="abort" />
   </restriction>
</simpleType>

<complexType name="ConditionRole">
   <complexContent>
      <extension base="xconnector:Role">
         <sequence>
                <choice minOccurs="1" maxOccurs="1">
                  <group ref="xconnector:ConditionGroup"/>
                </choice>
         </sequence>
      </extension>
   </complexContent>
</complexType>
```

```
<complexType name="Condition" abstract="true">
   <attribute name="isNegated" type="boolean" default="false"/>
</complexType>

<complexType name="SimpleCondition" abstract="true">
   <complexContent>
      <extension base="xconnector:Condition">
      </extension>
   </complexContent>
</complexType>

<complexType name="EventStateConditionType">
   <complexContent>
      <extension base="xconnector:SimpleCondition">
         <attribute name="comparator" type="xconnector:ComparatorType"
use="required"/>
         <attribute name="state" type="xconnector:StateType" use="required"/>
      </extension>
   </complexContent>
</complexType>

<complexType name="EventTransitionConditionType">
   <complexContent>
      <extension base="xconnector:SimpleCondition">
         <attribute name="transition" type="xconnector:TransitionType"
use="required"/>
      </extension>
   </complexContent>
</complexType>

<complexType name="EventAttributeConditionType">
   <complexContent>
      <extension base="xconnector:SimpleCondition">
         <attribute name="comparator" type="xconnector:ComparatorType"
use="required"/>
         <attribute name="attributeType" type="xconnector:AttributeType"
use="required"/>
         <attribute name="value" type="anySimpleType" use="required"/>
         <attribute name="attributeName" type="anySimpleType"/>
      </extension>
   </complexContent>
</complexType>

<complexType name="CompoundConditionType">
   <complexContent>
      <extension base="xconnector:Condition">
         <sequence>
               <choice minOccurs="2" maxOccurs="2">
                 <group ref="xconnector:ConditionGroup"/>
               </choice>
```

```
        </sequence>
        <attribute name="operator" type="xconnector:LogicalOperatorType"
use="required"/>
      </extension>
   </complexContent>
</complexType>

    <group name="ConditionGroup">
        <choice>
            <element ref="xconnector:eventStateCondition"/>
            <element ref="xconnector:eventTransitionCondition"/>
            <element ref="xconnector:eventAttributeCondition"/>
            <element ref="xconnector:compoundCondition"/>
        </choice>
    </group>
    <element name="eventStateCondition"
type="xconnector:EventStateConditionType"/>
    <element name="eventTransitionCondition"
type="xconnector:EventTransitionConditionType"/>
    <element name="eventAttributeCondition"
type="xconnector:EventAttributeConditionType"/>
    <element name="compoundCondition" type="xconnector:CompoundConditionType"/>

<simpleType name="LogicalOperatorType">
   <restriction base="string">
      <enumeration value="and" />
      <enumeration value="or" />
   </restriction>
</simpleType>

<simpleType name="ComparatorType">
   <restriction base="string">
      <enumeration value="eq"/>
      <enumeration value="ne"/>
      <enumeration value="gt"/>
      <enumeration value="ge"/>
      <enumeration value="lt"/>
      <enumeration value="le"/>
   </restriction>
</simpleType>

<simpleType name="StateType">
   <restriction base="string">
      <enumeration value="prepared" />
      <enumeration value="occurring" />
      <enumeration value="paused" />
      <enumeration value="finished" />
   </restriction>
</simpleType>

<simpleType name="TransitionType">
```

```
   <restriction base="string">
      <enumeration value="starts" />
      <enumeration value="stops" />
      <enumeration value="pauses" />
      <enumeration value="resumes" />
      <enumeration value="aborts" />
      <enumeration value="abortsFromPaused" />
      <enumeration value="ends" />
   </restriction>
</simpleType>

<simpleType name="AttributeType">
   <restriction base="string">
      <enumeration value="repeat" />
      <enumeration value="occurences" />
      <enumeration value="attribute" />
   </restriction>
</simpleType>

<complexType name="PropertyRole">
   <complexContent>
      <extension base="xconnector:Role">
         <sequence>
               <choice minOccurs="1" maxOccurs="1">
                 <group ref="xconnector:PropertyGroup"/>
               </choice>
         </sequence>
      </extension>
   </complexContent>
</complexType>

<complexType name="Property" abstract="true">
</complexType>

<complexType name="EventStatePropertyType">
   <complexContent>
      <extension base="xconnector:Property">
      </extension>
   </complexContent>
</complexType>

<complexType name="EventTransitionPropertyType">
   <complexContent>
      <extension base="xconnector:Property">
         <attribute name="transition" type="xconnector:TransitionType"
use="required"/>
         <attribute name="offset" type="xconnector:unsignedLongParamUnion"/>
      </extension>
   </complexContent>
</complexType>
```

```
<complexType name="EventAttributePropertyType">
   <complexContent>
      <extension base="xconnector:Property">
         <attribute name="attributeType" type="xconnector:AttributeType"
use="required"/>
         <attribute name="offset" type="anySimpleType"/>
      </extension>
   </complexContent>
</complexType>

    <group name="PropertyGroup">
        <choice>
            <element ref="xconnector:eventStateProperty"/>
            <element ref="xconnector:eventTransitionProperty"/>
            <element ref="xconnector:eventAttributeProperty"/>
        </choice>
    </group>
    <element name="eventStateProperty" type="xconnector:EventStatePropertyType"/>
    <element name="eventTransitionProperty"
type="xconnector:EventTransitionPropertyType"/>
    <element name="eventAttributeProperty"
type="xconnector:EventAttributePropertyType"/>

<complexType name="CausalGlue">
   <sequence>
     <choice minOccurs="1" maxOccurs="1">
       <group ref="xconnector:TriggerExpressionGroup"/>
      </choice>
      <choice minOccurs="1" maxOccurs="1">
            <group ref="xconnector:ActionExpressionGroup"/>
      </choice>
   </sequence>
</complexType>

<complexType name="ConstraintGlue">
   <sequence>
        <choice minOccurs="1" maxOccurs="1">
            <group ref="xconnector:PropertyExpressionGroup"/>
        </choice>
   </sequence>
</complexType>

<complexType name="TriggerExpression" abstract="true">
   <attribute name="isNegated" type="boolean" default="false"/>
   <attribute name="minDelay" type="xconnector:unsignedLongParamUnion"
default="0"/>
   <attribute name="maxDelay" type="xconnector:unsignedLongParamUnion"
default="0"/>
</complexType>

<complexType name="SimpleTriggerExpressionType">
```

```
   <complexContent>
      <extension base="xconnector:TriggerExpression">
         <attribute name="conditionRole" type="string" use="required"/>
         <attribute name="qualifier" type="xconnector:ConditionQualifierType"/>
      </extension>
   </complexContent>
</complexType>

<complexType name="CompoundTriggerExpressionType" >
   <complexContent>
      <extension base="xconnector:TriggerExpression">
         <choice>
            <sequence>
               <choice minOccurs="2" maxOccurs="2">
                 <group ref="xconnector:TriggerExpressionGroup"/>
               </choice>
            </sequence>
            <sequence>
               <choice minOccurs="1" maxOccurs="1">
                 <group ref="xconnector:TriggerExpressionGroup"/>
               </choice>
               <choice minOccurs="1" maxOccurs="1">
                 <group ref="xconnector:PropertyExpressionGroup"/>
               </choice>
            </sequence>
         </choice>
         <attribute name="operator" type="xconnector:LogicalOperatorType"
use="required"/>
      </extension>
   </complexContent>
</complexType>

    <group name="TriggerExpressionGroup">
        <choice>
            <element ref="xconnector:simpleTriggerExpression"/>
            <element ref="xconnector:compoundTriggerExpression"/>
        </choice>
    </group>
    <element name="simpleTriggerExpression"
type="xconnector:SimpleTriggerExpressionType"/>
    <element name="compoundTriggerExpression"
type="xconnector:CompoundTriggerExpressionType"/>

<simpleType name="ConditionQualifierType">
   <restriction base="string">
      <enumeration value="all" />
      <enumeration value="any" />
   </restriction>
</simpleType>

<complexType name="PropertyExpression" abstract="true">
```

```
</complexType>

<complexType name="SimplePropertyExpression" abstract="true">
   <complexContent>
      <extension base="xconnector:PropertyExpression">
         <attribute name="comparator" type="xconnector:ComparatorType"
use="required"/>
      </extension>
   </complexContent>
</complexType>

<complexType name="PropertyToPropertyExpressionType">
   <complexContent>
      <extension base="xconnector:SimplePropertyExpression">
         <attribute name="firstPropertyRole" type="string" use="required"/>
         <attribute name="firstQualifier"
type="xconnector:ConditionQualifierType"/>
         <attribute name="secondPropertyRole" type="string" use="required"/>
         <attribute name="secondQualifier"
type="xconnector:ConditionQualifierType"/>
      </extension>
   </complexContent>
</complexType>

<complexType name="AttributeToValueExpressionType">
   <complexContent>
      <extension base="xconnector:SimplePropertyExpression">
         <attribute name="propertyRole" type="string" use="required"/>
         <attribute name="qualifier" type="xconnector:ConditionQualifierType"/>
         <attribute name="value" type="anySimpleType" use="required"/>
      </extension>
   </complexContent>
</complexType>

<complexType name="EventStateToValueExpressionType">
   <complexContent>
      <extension base="xconnector:SimplePropertyExpression">
         <attribute name="propertyRole" type="string" use="required"/>
         <attribute name="qualifier" type="xconnector:ConditionQualifierType"/>
         <attribute name="state" type="xconnector:StateType" use="required"/>
      </extension>
   </complexContent>
</complexType>

<complexType name="CompoundPropertyExpressionType" >
   <complexContent>
      <extension base="xconnector:PropertyExpression">
         <sequence>
               <choice minOccurs="2" maxOccurs="2">
                 <group ref="xconnector:PropertyExpressionGroup"/>
               </choice>
```

```
        </sequence>
        <attribute name="operator" type="xconnector:LogicalOperatorType"
use="required"/>
      </extension>
   </complexContent>
</complexType>

    <group name="PropertyExpressionGroup">
        <choice>
            <element ref="xconnector:propertyToPropertyExpression"/>
            <element ref="xconnector:attributeToValueExpression"/>
            <element ref="xconnector:eventStateToValueExpression"/>
            <element ref="xconnector:compoundPropertyExpression"/>
        </choice>
    </group>
    <element name="propertyToPropertyExpression"
type="xconnector:PropertyToPropertyExpressionType"/>
    <element name="attributeToValueExpression"
type="xconnector:AttributeToValueExpressionType"/>
    <element name="eventStateToValueExpression"
type="xconnector:EventStateToValueExpressionType"/>
    <element name="compoundPropertyExpression"
type="xconnector:CompoundPropertyExpressionType"/>

<complexType name="ActionExpression" abstract="true">
   <attribute name="delay" type="xconnector:unsignedLongParamUnion" default="0"/>
</complexType>

<complexType name="SimpleActionExpressionType">
   <complexContent>
      <extension base="xconnector:ActionExpression">
         <attribute name="actionRole" type="string" use="required"/>
         <attribute name="qualifier" type="xconnector:ActionQualifierType"/>
      </extension>
   </complexContent>
</complexType>

<simpleType name="ActionQualifierType">
   <restriction base="string">
      <enumeration value="all" />
      <enumeration value="one" />
   </restriction>
</simpleType>

<complexType name="CompoundActionExpressionType" >
   <complexContent>
      <extension base="xconnector:ActionExpression">
         <sequence>
          <choice minOccurs="2" maxOccurs="2">
             <group ref="xconnector:ActionExpressionGroup"/>
          </choice>
```

```
        </sequence>
        <attribute name="operator" type="xconnector:CompoundActionOperatorType"
use="required"/>
      </extension>
   </complexContent>
</complexType>

<simpleType name="CompoundActionOperatorType">
   <restriction base="string">
      <enumeration value="par" />
      <enumeration value="seq" />
      <enumeration value="excl" />
   </restriction>
</simpleType>

    <group name="ActionExpressionGroup">
        <choice>
            <element ref="xconnector:simpleActionExpression"/>
            <element ref="xconnector:compoundActionExpression"/>
        </choice>
    </group>
    <element name="simpleActionExpression"
type="xconnector:SimpleActionExpressionType"/>
    <element name="compoundActionExpression"
type="xconnector:CompoundActionExpressionType"/>

<element name="connectorBase">
   <complexType>
      <sequence>
         <choice minOccurs="1" maxOccurs="unbounded">
              <group ref="xconnector:xconnectorGroup"/>
         </choice>
      </sequence>
      <attribute name="id" type="ID"/>
      <attribute name="name" type="string"/>
      <attribute name="description" type="string"/>
   </complexType>
</element>

<element name="causalConnector" type="xconnector:CausalHypermediaConnector" >
</element>

<element name="constraintConnector"
type="xconnector:ConstraintHypermediaConnector" >
</element>

<group name="xconnectorGroup">
    <choice>
        <element ref="xconnector:causalConnector"/>
        <element ref="xconnector:constraintConnector"/>
    </choice>
```

```
</group>
</schema>
```

12
Apêndice D

Especificação da linguagem XTemplate 2.1.

12.1.
XT-BasicContraints.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        xmlns:BasicConstraints="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicConstraints"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicConstraints"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XTemplate21.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="constraints" type="xtemplatelang:constraintsType"
substitutionGroup="xtemplatelang:constraints"/>
    <element name="constraint" type="xtemplatelang:constraintType"
substitutionGroup="xtemplatelang:constraint"/>

</schema>
```

12.2.
XT-BasicLinking.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        xmlns:BasicLinking="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicLinking"
        targetNamespace="http://www.telemidia.puc-
```

```
rio.br/specs/xml/XTemplate/BasicLinking"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XTemplate21.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="linkBase" type="xtemplatelang:linkBaseType"
substitutionGroup="xtemplatelang:linkBase"/>
    <element name="bind" type="xtemplatelang:bindType"
substitutionGroup="xtemplatelang:bind"/>
    <element name="link" type="xtemplatelang:linkType"
substitutionGroup="xtemplatelang:link"/>
</schema>
```


12.3. XT-BasicResources.xsd

```
<schema
        xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        xmlns:BasicResources="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicResources"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicResources"
        elementFormDefault="qualified"
>
        <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XTemplate21.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="resources" type="xtemplatelang:resourcesType"
substitutionGroup="xtemplatelang:resources"/>
    <element name="resource" type="xtemplatelang:resourceType"
substitutionGroup="xtemplatelang:resource"/>
</schema>
```

12.4. XT-BasicVocabulary.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        xmlns:BasicVocabulary="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicVocabulary"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicVocabulary"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XTemplate21.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="vocabulary" type="xtemplatelang:vocabularyType"
substitutionGroup="xtemplatelang:vocabulary"/>
    <element name="port" type="xtemplatelang:portType"
substitutionGroup="xtemplatelang:port"/>
    <element name="component" type="xtemplatelang:componentType"
substitutionGroup="xtemplatelang:component"/>
</schema>
```

12.5. XT-connector.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- define the vocabulary element prototype -->
    <complexType name="connectorPrototype">
          <attribute name="src" type="anyURI" use="required"/>
          <attribute name="type" type="NMTOKEN" use="required"/>
          <attribute name="minOccurs" type="positiveInteger"/>
          <attribute name="maxOccurs" type="xtemplate:maxUnion"/>
    </complexType>
```

```
    <!-- define the global vocabulary elements -->
    <element name="connector" type="xtemplatelang:connectorType"
substitutionGroup="xtemplatelang:connector"/>
</schema>
```

12.6. XT-ConnectorVocabulary.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        xmlns:ConnectorVocabulary="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/ConnectorVocabulary"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/ConnectorVocabulary"
        elementFormDefault="qualified">

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XTemplate21.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="connector" type="xtemplatelang:connectorType"
substitutionGroup="xtemplatelang:connector"/>
</schema>
```

12.7. XT-constraints.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- define the constraints element prototype -->
    <complexType name="constraintsPrototype">
    </complexType>
```

```
    <complexType name="constraintPrototype">
       <attribute name="select" type="string" use="required" />
       <attribute name="description" type="string" />
    </complexType>

    <!-- define the global constraints elements -->
    <element name="constraints" type="xtemplatelang:constraintsType"
substitutionGroup="xtemplatelang:constraints"/>
    <element name="constraint" type="xtemplatelang:constraintType"
substitutionGroup="xtemplatelang:constraint"/>
</schema>
```

12.8. XTemplate21.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <!-- include the schema files for the building block types -->
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-
struct.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-
vocabulary.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-
constraints.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-
resources.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-
connector.xsd"/>
    <include schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-
linking.xsd"/>

    <!-- import the NCL 2.0 language namespace -->
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- import the definitions in the modules namespaces -->
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Structure"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-Structure.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicVocabulary"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-BasicVocabulary.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicConstraints"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-BasicConstraints.xsd"/>
    <import namespace="http://www.telemidia.puc-
```

```
rio.br/specs/xml/XTemplate/BasicResources"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-BasicResources.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/ConnectorVocabulary"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-
ConnectorVocabulary.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/BasicLinking"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-BasicLinking.xsd"/>
</schema>
```

12.9. XT-language.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
           xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
              xmlns:xtemplatexslt="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/XTemplateXSLT"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        elementFormDefault="qualified">

    <!-- import the xtemplate namespaces -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XTemaplate21.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/XTemplateXSLT"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-xslt.xsd"/>

    <!-- ================================================================= -->
    <!-- CoreAttrs attribute group used on all xtemplate profile elements    -->
    <!-- ================================================================= -->
    <attributeGroup name="CoreAttrs">
        <attribute name="id" type="ID" />
    </attributeGroup>

    <!-- ================================================================= -->
    <!-- Structure Functionality                                           -->
    <!-- ================================================================= -->

    <!-- ================================================================= -->
    <!-- define the top down structure of an xtemplate language document.    -->
    <!-- ================================================================= -->

    <!-- top level xtemplate element and content model -->
    <element name="xtemplate" type="xtemplatelang:xtemplateType"/>
    <complexType name="xtemplateType">
        <complexContent>
```

```
            <extension base="xtemplate:xtemplatePrototype">
                <sequence>
                    <element ref="xtemplatelang:head" minOccurs="0"
maxOccurs="1"/>
                    <element ref="xtemplatelang:body" minOccurs="1"
maxOccurs="1"/>
                </sequence>
                <attributeGroup ref="xtemplatelang:CoreAttrs"/>
                          <attribute name="name" type="string"/>
                          <attribute name="description" type="string"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- head element and content model -->
    <element name="head" type="xtemplatelang:headType"/>
    <complexType name="headType">
        <complexContent>
            <extension base="xtemplate:headPrototype">
               <choice minOccurs="0" maxOccurs="unbounded">
                  <group ref="xtemplatelang:vocabularyGroup"/>
                  <group ref="xtemplatelang:constraintsGroup"/>
                  <group ref="xtemplatelang:resourcesGroup"/>
               </choice>
            </extension>
        </complexContent>
    </complexType>

    <!-- body element and content model -->
    <element name="body" type="xtemplatelang:bodyType"/>
    <complexType name="bodyType">
        <complexContent>
            <extension base="xtemplate:bodyPrototype">
                    <sequence>
                        <choice minOccurs="0" maxOccurs="unbounded">
                             <group ref="xtemplatelang:linkBaseGroup"/>
                             <group ref="xtemplatelang:stylesheetGroup"/>
                        </choice>
                    </sequence>
            </extension>
        </complexContent>
    </complexType>

    <group name="stylesheetGroup">
        <choice>
            <element ref="xtemplatexslt:stylesheet"/>
        </choice>
    </group>

    <!-- ================================================================= -->
    <!-- linkBase Functionality                                            -->
```

```
<!-- ================================================================== -->

<!-- linkBase element and content model -->
<element name="linkBase" type="xtemplatelang:linkBaseType"/>
<complexType name="linkBaseType">
    <complexContent>
        <extension base="xtemplate:linkBasePrototype">
                    <sequence>
            <choice minOccurs="0" maxOccurs="unbounded">
                <group ref="xtemplatelang:linkGroup"/>
                <group ref="xtemplatelang:stylesheetGroup"/>
            </choice>
                    </sequence>
        </extension>
    </complexContent>
</complexType>

<group name="linkBaseGroup">
    <choice>
        <element ref="xtemplatelang:linkBase"/>
    </choice>
</group>

<!-- link element and content model -->
<element name="link" type="xtemplatelang:linkType"/>

<complexType name="linkType">
    <complexContent>
        <extension base="xtemplate:linkPrototype">
            <choice minOccurs="0" maxOccurs="unbounded">
                <group ref="xtemplatelang:bindGroup"/>
            </choice>
            <attributeGroup ref="xtemplatelang:CoreAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- link groups -->
<group name="linkGroup">
    <choice>
        <element ref="xtemplatelang:link"/>
    </choice>
</group>

<!-- bind element and content model -->
<element name="bind" type="xtemplatelang:bindType"/>
<complexType name="bindType">
    <complexContent>
       <extension base="xtemplate:bindPrototype">
            <attributeGroup ref="xtemplatelang:CoreAttrs"/>
    </extension>
```

```
            </complexContent>
    </complexType>

    <!-- bind groups -->
    <group name="bindGroup">
        <choice>
            <element ref="xtemplatelang:bind"/>
        </choice>
    </group>

    <!-- ================================================================= -->
    <!-- vocabulary Functionality                                          -->
    <!-- ================================================================= -->

    <!-- vocabulary element and content model -->
    <element name="vocabulary" type="xtemplatelang:vocabularyType"/>
    <complexType name="vocabularyType">
        <complexContent>
            <extension base="xtemplate:vocabularyPrototype">
                <choice maxOccurs="unbounded">
                    <group ref="xtemplatelang:componentGroup"/>
                    <group ref="xtemplatelang:connectorGroup"/>
                </choice>
            </extension>
        </complexContent>
    </complexType>

    <group name="vocabularyGroup">
        <choice>
            <element ref="xtemplatelang:vocabulary"/>
        </choice>
    </group>

    <!-- connector element and content model -->
    <element name="connector" type="xtemplatelang:connectorType"/>

    <complexType name="connectorType">
        <complexContent>
            <extension base="xtemplate:connectorPrototype">
                <attributeGroup ref="xtemplatelang:CoreAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- connector groups -->
    <group name="connectorGroup">
        <choice>
            <element ref="xtemplatelang:connector"/>
        </choice>
    </group>
```

```
<!-- component element and content model -->
<element name="component" type="xtemplatelang:componentType"/>

<complexType name="componentType">
    <complexContent>
        <extension base="xtemplate:componentPrototype">
            <choice minOccurs="0" maxOccurs="unbounded">
                <group ref="xtemplatelang:componentGroup"/>
                <group ref="xtemplatelang:portGroup"/>
            </choice>
            <attributeGroup ref="xtemplatelang:CoreAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- component groups -->
<group name="componentGroup">
    <choice>
        <element ref="xtemplatelang:component"/>
    </choice>
</group>

<!-- port element and content model -->
<element name="port" type="xtemplatelang:portType"/>
<complexType name="portType">
    <complexContent>
       <extension base="xtemplate:portPrototype">
            <attributeGroup ref="xtemplatelang:CoreAttrs"/>
        </extension>
   </complexContent>
</complexType>

<!-- port groups -->
<group name="portGroup">
    <choice>
        <element ref="xtemplatelang:port"/>
    </choice>
</group>

<!-- ================================================================== -->
<!-- constraints Functionality                                          -->
<!-- ================================================================== -->

<!-- constraints element and content model -->
<element name="constraints" type="xtemplatelang:constraintsType"/>
<complexType name="constraintsType">
    <complexContent>
        <extension base="xtemplate:constraintsPrototype">
            <choice maxOccurs="unbounded">
                <group ref="xtemplatelang:constraintGroup"/>
            </choice>
```

```
        </extension>
    </complexContent>
</complexType>

<group name="constraintsGroup">
    <choice>
        <element ref="xtemplatelang:constraints"/>
    </choice>
</group>

<!-- constraint element and content model -->
<element name="constraint" type="xtemplatelang:constraintType"/>

<complexType name="constraintType">
    <complexContent>
        <extension base="xtemplate:constraintPrototype">
           <attributeGroup ref="xtemplatelang:CoreAttrs"/>
        </extension>
    </complexContent>
</complexType>

<!-- constraint groups -->
<group name="constraintGroup">
    <choice>
        <element ref="xtemplatelang:constraint"/>
    </choice>
</group>

<!-- ================================================================= -->
<!-- Resources Functionality                                           -->
<!-- ================================================================= -->

<!-- resources element and content model -->
<element name="resources" type="xtemplatelang:resourcesType"/>
<complexType name="resourcesType">
    <complexContent>
        <extension base="xtemplate:resourcesPrototype">
            <choice maxOccurs="unbounded">
                <group ref="xtemplatelang:resourceGroup"/>
            </choice>
        </extension>
    </complexContent>
</complexType>

<group name="resourcesGroup">
    <choice>
        <element ref="xtemplatelang:resources"/>
    </choice>
</group>

<!-- resource element and content model -->
```

```
    <element name="resource" type="xtemplatelang:resourceType"/>

    <complexType name="resourceType">
        <complexContent>
            <extension base="xtemplate:resourcePrototype">
                <attributeGroup ref="xtemplatelang:CoreAttrs"/>
            </extension>
        </complexContent>
    </complexType>

    <!-- resource groups -->
    <group name="resourceGroup">
        <choice>
            <element ref="xtemplatelang:resource"/>
        </choice>
    </group>
</schema>
```

12.10. XT-linking.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- define thlinkBasery element prototype -->
    <complexType name="linkBasePrototype">
    </complexType>

    <!-- define the link element prototype -->
    <complexType name="linkPrototype">
               <attribute name="type" type="NMTOKEN" use="required"/>
    </complexType>

    <!-- define the bind element prototype -->
    <complexType name="bindPrototype">
       <attribute name="role" type="string" use="required"/>
       <attribute name="select" type="string" use="required"/>
    </complexType>

    <!-- define the global linkBase elements -->
    <element name="linkBase" type="xtemplatelang:linkBaseType"
substitutionGroup="xtemplatelang:linkBase"/>
```

```
    <element name="bind" type="xtemplatelang:bindType"
substitutionGroup="xtemplatelang:bind"/>
    <element name="link" type="xtemplatelang:linkType"
substitutionGroup="xtemplatelang:link"/>
</schema>
```

12.11. XT-resources.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- define the constraints element prototype -->
    <complexType name="resourcesPrototype">
    </complexType>

    <complexType name="resourcePrototype">
          <attribute name="src" type="anyURI" use="required"/>
          <attribute name="type" type="string" use="required"/>
          <attribute name="label" type="string" use="required"/>
    </complexType>

    <!-- define the global resources elements -->
    <element name="resources" type="xtemplatelang:resourcesType"
substitutionGroup="xtemplatelang:resources"/>
    <element name="resource" type="xtemplatelang:resourceType"
substitutionGroup="xtemplatelang:resource"/>
</schema>
```

12.12. XT-struct.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>
```

```
    <!-- define the structure module attribute group -->
    <attributeGroup name="structureModuleAttrs">
    </attributeGroup>

    <!-- define the xtemplate element prototype -->
    <complexType name="xtemplatePrototype">
    </complexType>

    <!-- define the head element prototype -->
    <complexType name="headPrototype">
    </complexType>

    <!-- define the body element prototype -->
    <complexType name="bodyPrototype">
    </complexType>

    <!-- declare global elements -->
    <element name="xtemplate" type="xtemplatelang:xtemplateType"
substitutionGroup="xtemplatelang:xtemplate"/>
    <element name="head" type="xtemplatelang:headType"
substitutionGroup="xtemplatelang:head"/>
    <element name="body" type="xtemplatelang:bodyType"
substitutionGroup="xtemplatelang:body"/>
</schema>
```

12.13. XT-Structure.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        xmlns:Structure="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Structure"
        targetNamespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Structure"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <!-- import the definitions in the ncl namespace -->
    <import namespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XTemplate21.xsd"/>
    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- declare global elements in this module -->
    <element name="xtemplate" type="xtemplatelang:xtemplateType"
substitutionGroup="xtemplatelang:xtemplate"/>
    <element name="head" type="xtemplatelang:headType"
```

```
substitutionGroup="xtemplatelang:head"/>
    <element name="body" type="xtemplatelang:bodyType"
substitutionGroup="xtemplatelang:body"/>
</schema>
```

12.14. XT-vocabulary.xsd

```
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:xtemplate="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        xmlns:xtemplatelang="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
        targetNamespace="http://www.telemidia.puc-rio.br/specs/xml/XTemplate/"
        elementFormDefault="qualified" attributeFormDefault="unqualified" >

    <import namespace="http://www.telemidia.puc-
rio.br/specs/xml/XTemplate/Language"
schemaLocation="file:../mediaContent/data/schemas/ncl21/XT-language.xsd"/>

    <!-- define the vocabulary element prototype -->
    <complexType name="vocabularyPrototype">
    </complexType>

    <complexType name="componentPortPrototype">
              <attribute name="type" type="NMTOKEN" use="required"/>
              <attribute name="ctype" type="string"/>
              <attribute name="minOccurs" type="positiveInteger"/>
              <attribute name="maxOccurs" type="xtemplate:maxUnion"/>
    </complexType>

    <!-- define the component element prototype -->
    <complexType name="componentPrototype">
        <complexContent>
            <extension base="xtemplate:componentPortPrototype">
            </extension>
        </complexContent>
    </complexType>

<simpleType name="CompTypes">
    <restriction base="string">
              <enumeration value="video" />
              <enumeration value="audio" />
              <enumeration value="text" />
              <enumeration value="img" />
              <enumeration value="animation" />
              <enumeration value="script" />
              <enumeration value="application" />
              <enumeration value="composite" />
    </restriction>
</simpleType>
```

```
<simpleType name="maxUnion">
     <union memberTypes="positiveInteger string"/>
</simpleType>

    <!-- define the global component attribute -->
    <!-- define the port element prototype -->
    <complexType name="portPrototype">
        <complexContent>
            <extension base="xtemplate:componentPortPrototype">
            </extension>
        </complexContent>
    </complexType>

    <!-- define the component attributeGroup -->
    <attributeGroup name="componentAttrs">
        <attribute name="component" type="IDREF" use="optional"/>
    </attributeGroup>

    <!-- define the global vocabulary elements -->
    <element name="vocabulary" type="xtemplatelang:vocabularyType"
substitutionGroup="xtemplatelang:vocabulary"/>
    <element name="port" type="xtemplatelang:portType"
substitutionGroup="xtemplatelang:port"/>
    <element name="component" type="xtemplatelang:componentType"
substitutionGroup="xtemplatelang:component"/>
</schema>
```