B

SMIL Implementation Reference

In the ten years that SMIL has been a W3C Recommendation, the specification has enjoyed focused acceptance in several key multimedia communities. Of these, desktop and general Web use has *not* been the area where SMIL has shined. One reason for this is a general lack of interoperability: many SMIL players exhibit the same behavior for key SMIL functionality, but they often do not share the basic media formats used in presentations. Ambulant is not allowed to integrate RealMedia, the Windows Media Player has a structural aversion to things not locally developed, and Apple prefers to have Quicktime communicate with its own servers and formats. This makes the work of a media-based presentation designer frustrating. As a result, technologies such as Flash are used — not because they are more powerful than SMIL, but because Flash defines it own video formats.

Still, SMIL's advantages as being a portable, declarative format in which the time-based of multiple objects in a presentation is not an after-thought (such as is the case with HTML), means that there are a number of application areas in which SMIL continues to have a substantial presence. From mobile telephones to outdoor digital signage, from set-to-boxes to server-side playlists, SMIL is able to play a substantial role whenever presentations need to be generated automatically and customized dynamically. These areas are expected to grown in importance in the coming years.

This section surveys various implementations of SMIL. This list was compiled in late 2008, and reflects the current state of technology at the time that SMIL 3.0 was released. The list is presented as a general guide, not a definitive resource. From time to time, we will update this list on the book's web site.

B.1 SMIL Language Profile Player/Browser Implementations

The LANGUAGE profile players support the bulk of SMIL's features. These players are usually architected to be direct user-level interfaces to SMIL. Many of these players also can be used as SMIL engines that are embedded into browser plug-in.

The following players support recent versions of the LANGUAGE profile:

From *SMIL 3.0: Interactive Multimedia for the Web, Mobile Devices and Daisy Talking Books*
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- *RealNetworks RealPlayer*: The RealPlayer is the dominant commercial user agent for the SMIL LANGUAGE profile. The core of the RealPlayer is available under a RealNetworks open source license through the *Helix* project.
- *CWI Ambulant Player*: The Ambulant player is an open source implementation that is geared to the early-access needs of the research community. The Ambulant player is available under a GNU open source license.
- *Oratrix* GR*i*NS: GR*i*NS is a commercial implementation of a specialty SMIL player that is used primarily as a preview player for the Oratrix GR*i*NS authoring system. GR*i*NS is a SMIL 2.0 player.

Apple was also an early supporter of SMIL. It embedded a version of a SMIL 1.0 player within QuickTime for supporting dynamically generated content. It also uses SMIL as a playlist format. Since these implementations have not kept up with enhancements in the Language profile in SMIL 2.0 and SMIL 3.0, we do not list them here.

B.2 SMIL Mobile Profile Player/Browser Implementations

One of the most successful deployment areas of SMIL technology has been in the area of mobile systems. SMIL's ability to construct adaptive presentations that can be scaled to the needs of particular distribution platform, together with SMIL's separation of content and structure, provides an efficient framework for deployment on the wide range of mobile platforms.

The following players support versions of the SMIL mobile profile:

- *Access Technology Embedded SMIL player:* Access Technology Limited is a Japanese/US company that, among other activities, owns PalmSoft. The company developed a SMIL engine within its popular HTML browser framework. This player is largely compliant with the *3*GPP consortium's MMS version of SMIL. 3GPP's standardization has resulted in interoperable implementations of SMIL on millions of handsets per year that are supported by Access, Ericsson, Motorola, Nokia, Samsung and a host of other vendors. (The success of these formats is due, in part, to the standardization of common media formats that all vendors must support.) We have selected Access as a representative mobile platform. They were and continue to be active in the SMIL standardization activities of W3C.
- *CWI Ambulant Player*: The Ambulant player is an open source implementation that is geared to the early-access needs of the research community. The mobile versions of Ambulant are geared to PDAs and handheld devices. The Ambulant player is available under a GNU open source license. Since this player can also support for Language profile documents, we do not consider it separately as a mobile device.

Note that although 3GPP players support a rich subset of SMIL, they often are not available as direct user agents on mobile telephones. The reason for this

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is that the entire communications stacks are telephones are highly controlled environments — partially because nearly all media operations will result in end-user charges. Most operators wrap SMIL support in their own proprietary interfaces.

B.3 SMIL Mobile Profile Player/Browser Implementations

There are dozens of vendors of Daisy-based assistive technology on hardware and software platforms. Many of these support a limited subset of SMIL 2.0 that is geared to the needs of the talking-book community. At the time that SMIL 3.0 was being developed, a separate profile for the talking book community was integrated into the standard. The DAISY profile is one of the richer collection of SMIL modules. It is focused on the integration of SMIL as a temporal engine that is used to trigger content that can be displayed via a conventional browser interface.

A reference player for the DAISY profile is implemented by AMIS, provided as an open source project by the Daisy-for-All foundation. Support for SMIL 3.0 functionality within AMIS is provided by an embedded Ambulant player.

A general description of a Daisy-compliant player is given in the table below. Daisy was still in the midst of it own standardization process (as the NSI/NISO Z39.86 Specification for the Digital Talking Book). This effort may result in minor changes to the supported feature set provided in our table.

B.4 SMIL Tiny Player/Browser Implementations

SMIL enjoys a large number of small-scale implementations, mostly by research groups. Of course, all SMIL players are also SMIL TINY players, since this profile defines the lowest common denominator of SMIL technology.

Two applications have driven the development of SMIL TINY: the development of server-side playlists and the development of communications-based set-top-boxes. Both of these applications develop broadly-based deployment of SMIL in consumer settings. There are already a wide collection of server-side playlists that use SMIL, from Apple, Microsoft, RealNetworks and others. Within the set-top-box community, an initial version of SMIL TINY has been released as part of the Ginga-NCL infrastructure in South America.

In Table B-1, two example bundles of technology are presented for a server-side player and for a set-top implementation of SMIL TINY.

B.5 SMIL Implementation Support Comparison

Table B-1 provides an indication of SMIL support at the time that SMIL 3.0 was released. It should be used for purposes of broad comparison, not a detailed listing of every aspect of the implementations listed.

From *SMIL 3.0: Interactive Multimedia for the Web, Mobile Devices and Daisy Talking Books*
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Functional Groups		Elements/Attributes	RealPlayer	Ambulant	GRiNS	Access	Daisy	Playlist	Ginga-NCL
	Structure	<smil>	▣	▣	▣	▣	▣	▣	▣
		<head>	▣	▣	▣	▣	▣	▣	▣
		<body>	▣	▣	▣	▣	▣	▣	▣
		baseProfile	▣	▣	▣	–	▣	▣	▣
		class	▣	▣	▣	–	▣	▣	▣
		id	▣	▣	▣	–	▣	▣	▣
		title	▣	▣	▣	–	▣	▣	▣
		version	▣	▣	▣	–	▣	▣	▣
		xml:lang	▣	▣	▣	–	▣	▣	▣
		xml:space	▣	▣	–	–	▣	▣	▣
		xmlns	▣	▣	▣	▣	▣	▣	▣
	Media Object	<ref>	▣	▣	▣	◈	▣	▣	▣
		<animation>	▣	▣	▣	▣	▣	▣	▣
		<audio>	▣	▣	▣	▣	▣	▣	▣
		<img>	▣	▣	▣	▣	▣	▣	▣
		<text>	▣	▣	▣	▣	▣	▣	▣
		<textstream>	▣	▣	▣	▣	▣	▣	▣
		<video>	▣	▣	▣	▣	▣	▣	▣
		<brush>	▣	▣	▣	–	–	–	–
		<param>	▣	▣	▣	▣	▣	–	–
		<paramGroup>	▣	▣	▣	–	▣	–	–
		abstract	▣	▣	▣	▣	▣	▣	▣
		alt	▣	▣	▣	▣	▣	▣	▣
		author	▣	▣	▣	▣	▣	▣	▣
		chromaKey	▣	▣	–	–	–	–	–
		chromaKeyOpacity	▣	▣	–	–	–	–	–
		chromaKeyTolerance	▣	▣	–	–	–	–	–
		clipBegin	▣	▣	▣	▣	▣	–	◈
		clipEnd	▣	▣	▣	▣	▣	–	◈
		color	▣	▣	▣	–	–	–	–
		copyright	▣	▣	▣	▣	▣	▣	▣
		erase	▣	▣	▣	–	–	–	–
		id	▣	▣	▣	–	–	–	–
		longdesc	▣	▣	▣	▣	▣	▣	▣
		mediaBackgroundOpacity	▣	▣	–	–	–	–	–
		mediaOpacity	▣	▣	–	–	–	–	–
		mediaRepeat	▣	▣	▣	–	–	–	–
		name	▣	▣	▣	▣	–	–	–
		panZoom	▣	▣	–	–	–	–	–
		paramGroup	▣	▣	◈	–	▣	–	–
		readIndex	▣	▣	▣	▣	–	–	–
		sensitivity[1]	▣	◈	▣	–	–	–	–
		src	▣	▣	▣	▣	▣	▣	▣
		type	▣	▣	▣	▣	▣	–	–
		type	▣	▣	▣	–	▣	–	–
		value	▣	▣	▣	▣	▣	–	–
		valuetype	▣	▣	▣	–	▣	–	–

Table B-1. SMIL implementation table.

Functional Groups		Elements/Attributes	RealPlayer	Ambulant	GRiNS	Access	Daisy	Playlist	Ginga-NCL
	Metadata	<meta>	▣	▣	▣	▣	▣	▣	▣
		<metadata>	▣	▣	▣	▣	▣	▣	▣
		content	▣	▣	▣	▣	▣	▣	▣
		label	▣	▣	▣	–	▣	▣	▣
		name	▣	▣	▣	▣	▣	▣	▣
	Timing & Synch.	<seq>	▣	▣	▣	▣	▣	▣	▣
		<par>	▣	▣	▣	▣	▣	▣	▣
		<excl>	▣	▣	▣	–	▣	–	–
		<priorityClass>	▣	▣	▣	–	–	–	–
		begin	▣	▣	▣	▣	▣	▣	▣
		begin (event)	▣	▣	▣	▣	▣	–	–
		begin (media marker)	▣	▣	▣	▣	–	–	–
		begin (repeat)	▣	▣	▣	–	–	–	–
		begin (wallclock)	▣	▣	▣	–	–	–	–
		dur	▣	▣	▣	▣	▣	▣	▣
		end	▣	▣	▣	▣	▣	▣	▣
		end (event)	▣	▣	▣	▣	▣	–	–
		end (media marker)	▣	▣	▣	▣	–	–	–
		end (repeat)	▣	▣	▣	–	–	–	–
		end (wallclock)	▣	▣	▣	–	–	–	–
		endsync	▣	▣	▣	▣	▣	▣	▣
		fill	▣	▣	▣	▣	▣	▣	▣
		fillDefault	▣	▣	▣	–	–	–	–
		max	▣	▣	▣	▣	–	–	–
		min	▣	▣	▣	▣	–	–	–
		pauseDisplay	▣	▣	▣	–	–	–	–
		peers	▣	▣	▣	–	–	–	–
		repeat	▣	▣	▣	–	–	–	–
		repeatCount	▣	▣	▣	▣	–	–	–
		repeatDur	▣	▣	▣	▣	–	–	–
		restart	▣	▣	▣	–	–	–	–
		restartDefault	▣	▣	▣	–	–	–	–
		syncBehavior	▣	–	▣	–	–	–	–
		syncBehaviorDefault	▣	–	▣	–	–	–	–
		syncMaster	▣	–	▣	–	–	–	–
		syncTolerance	▣	–	▣	–	–	–	–
		syncToleranceDefault	▣	–	▣	–	–	–	–
		timeAction	▣	–	–	–	–	–	–
		timeContainer	▣	–	–	–	–	–	–
		accelerate	◈	–	▣	–	–	–	–
		autoReverse	◈	–	▣	–	–	–	–
		decelerate	◈	–	▣	–	–	–	–
		speed	◈	–	▣	–	–	–	–
	Layout	<layout>	▣	▣	▣	▣	▣	▣	▣
		<region>	▣	▣	▣	▣	▣	–	◈
		<regPoint>	▣	▣	▣	–	–	–	◈
		<root-layout>	▣	▣	▣	▣	▣	–	◈

Table B-1 (continued). SMIL implementation table.

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Functional Groups	Elements/Attributes	RealPlayer	Ambulant	GRiNS	Access	Daisy	Playlist	Ginga-NCL
Layout (Ctd)	<topLayout>[4]	▣	◈	▣	–	–	–	–
	backgroundColor	▣	▣	▣	▣	▣	–	◈
	backgroundImage	–	▣	–	–	–	–	–
	backgroundOpacity	▣	▣	–	–	▣	–	–
	backgroundRepeat	–	▣	–	–	–	–	–
	region	▣	▣	▣	▣	▣	–	◈
	bottom	▣	▣	▣	–	▣	–	◈
	height	▣	▣	▣	▣	▣	–	◈
	left	▣	▣	▣	▣	▣	–	◈
	right	▣	▣	▣	▣	▣	–	◈
	top	▣	▣	▣	▣	▣	–	◈
	width	▣	▣	▣	▣	▣	–	◈
	z-index	▣	▣	▣	▣	▣	–	◈
	fit[5]	▣	◈	▣	▣	▣	–	◈
	open[4]	▣	▣	▣	–	–	–	–
	close[4]	▣	▣	▣	–	–	–	–
	regionName	▣	▣	▣	▣	▣	–	–
	regAlign	▣	▣	▣	–	–	–	–
	regPoint	▣	▣	▣	–	–	–	–
	mediaAlign	▣	▣	▣	–	–	–	–
	soundAlign	▣	▣	▣	–	–	–	–
	soundLevel	▣	▣	▣	▣	–	–	◈
	showBackground	▣	▣	▣	–	▣	–	◈
smilText	<smilText>	▣	▣	–	–	–	–	–
	<tev>	▣	▣	–	–	–	–	–
	 	▣	▣	–	–	–	–	–
	<clear>	▣	▣	–	–	–	–	–
		▣	▣	–	–	–	–	–
	<p>	▣	▣	–	–	–	–	–
		▣	▣	–	–	–	–	–
	<textStyle>	▣	▣	–	–	–	–	–
	<textStyling>	▣	▣	–	–	–	–	–
	begin	▣	▣	–	–	–	–	–
	next	▣	▣	–	–	–	–	–
	textWrapOption	◈	▣	–	–	–	–	–
	textAlign	◈	▣	–	–	–	–	–
	textBackgroundColor	▣	▣	–	–	–	–	–
	textColor	▣	▣	–	–	–	–	–
	textDirection	◈	▣	–	–	–	–	–
	textFontFamily	▣	▣	–	–	–	–	–
	textFontSize	▣	▣	–	–	–	–	–
	textFontStyle	▣	▣	–	–	–	–	–
	textFontWeight	▣	▣	–	–	–	–	–
	textMode	◈	▣	–	–	–	–	–
	textPlace	◈	▣	–	–	–	–	–
	textStyle	▣	▣	–	–	–	–	–
	textWritingMode	◈	▣	–	–	–	–	–

Table B-1 (continued). SMIL implementation table.

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Functional Groups		Elements/Attributes	RealPlayer	Ambulant	GRiNS	Access	Daisy	Playlist	Ginga-NCL
	smilText (Ctd.)	textConceal	◇	▣	–	–	–	–	–
		textRate	▣	▣	–	–	–	–	–
	Linking	<a>	▣	▣	▣	▣	▣	–	–
		<anchor>	▣	▣	▣	–	▣	–	–
		<area>	▣	▣	▣	▣	▣	–	–
		accesskey	▣	▣	▣	▣	–	–	–
		actuate	▣	▣	▣	▣	–	–	–
		alt	▣	▣	▣	–	–	–	–
		coords[2]	▣	◇	▣	▣	▣	–	–
		destinationLevel	▣	–	◇	–	–	–	–
		destinationPlaystate[2]	▣	◇	▣	–	–	–	–
		external	▣	▣	▣	–	–	–	–
		fragment	▣	▣	▣	–	–	–	–
		href	▣	▣	▣	▣	▣	–	–
		nohref	▣	▣	▣	▣	▣	–	–
		shape[2]	▣	◇	▣	▣	▣	–	–
		show	▣	▣	▣	–	–	–	–
		sourceLevel	▣	–	◇	–	–	–	–
		sourcePlaystate[2]	▣	◇	▣	–	–	–	–
		tabindex	▣	▣	▣	–	–	–	–
		target	▣	▣	▣	–	–	–	–
	Content Control	<switch>	▣	▣	▣	▣	▣	–	▣
		<prefetch>	▣	◇	◇	–	–	–	◇
		<customTest>	▣	▣	▣	–	–	–	–
		<customAttributes>	▣	▣	▣	–	–	–	–
		skip-content	▣	▣	▣	▣	▣	▣	▣
		systemRequired	▣	▣	▣	▣	▣	▣	▣
		systemAudioDesc	▣	▣	▣	▣	▣	–	▣
		systemBaseProfile	▣	▣	–	–	▣	–	▣
		systemBitrate	▣	▣	▣	▣	▣	–	▣
		systemCaptions	▣	▣	▣	▣	▣	–	▣
		systemComponent	▣	▣	▣	▣	▣	–	▣
		systemCPU	▣	▣	▣	▣	▣	–	▣
		systemLanguage	▣	▣	▣	▣	▣	–	▣
		systemOperatingSystem	▣	▣	▣	▣	▣	–	▣
		system-overdub-or-caption	▣	▣	▣	▣	▣	–	▣
		systemOverdubOrSubtitle	▣	▣	▣	▣	▣	–	▣
		systemScreenDepth	▣	▣	▣	▣	▣	–	▣
		systemScreenSize	▣	▣	▣	▣	▣	–	▣
		systemVersion	▣	▣	–	–	▣	–	▣
		bandwidth	▣	◇	◇	–	–	–	◇
		mediaSize, mediaTimes	▣	◇	◇	–	–	–	◇
		allowReorder	▣	▣	◇	–	▣	–	▣
		customTest	▣	▣	▣	–	–	–	–
		defaultState	▣	▣	▣	–	–	–	–
		override	▣	▣	▣	–	–	–	–
		uid	▣	▣	▣	–	–	–	–

Table B-1 (continued). SMIL implementation table.

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Functional Groups		Elements/Attributes	RealPlayer	Ambulant	GRiNS	Access	Daisy	Playlist	Ginga-NCL
	Transition Effects	<transition>	▣	▣	▣	▣	–	–	–
		transIn	▣	▣	▣	▣	–	–	–
		transOut	▣	▣	▣	▣	–	–	–
		begin	▣	◈	–	–	–	–	–
		borderColor	▣	–	▣	–	–	–	–
		borderWidth	▣	–	▣	–	–	–	–
		by	▣	◈	–	–	–	–	–
		direction	▣	▣	▣	–	–	–	–
		dur	▣	▣	▣	▣	–	–	–
		endProgress	▣	▣	▣	–	–	–	–
		fadeColor	▣	▣	▣	▣	–	–	–
		“fill=””transition”””	▣	▣	–	–	–	–	–
		from	▣	◈	–	–	–	–	–
		horzRepeat	▣	–	▣	–	–	–	–
		mode	▣	◈	–	–	–	–	–
		scope	–	▣	▣	–	–	–	–
		startProgress	▣	▣	▣	–	–	–	–
		subtype[3]	▣	▣	▣	▣	–	–	–
		to	▣	◈	–	–	–	–	–
		type	▣	▣	▣	▣	–	–	–
		values	▣	–	–	–	–	–	–
		vertRepeat	▣	–	▣	–	–	–	–
	Animation	<animate>	▣	▣	▣	◈	–	–	–
		<animateColor>	▣	▣	▣	–	–	–	–
		<animateMotion>	▣	▣	▣	–	–	–	–
		<set>	▣	▣	▣	–	–	–	–
		accumulate	▣	▣	▣	–	–	–	–
		actuate	▣	▣	▣	–	–	–	–
		additive	▣	▣	▣	–	–	–	–
		attributeName	▣	▣	▣	▣	–	–	–
		attributeType	▣	▣	▣	–	–	–	–
		by	▣	▣	▣	–	–	–	–
		calcMode	▣	▣	▣	–	–	–	–
		calcMode	▣	–	▣	–	–	–	–
		calcMode	–	–	–	–	–	–	–
		from	▣	▣	▣	▣	–	–	–
		href	▣	▣	▣	–	–	–	–
		keySplines	–	–	▣	–	–	–	–
		keyTimes	–	–	▣	–	–	–	–
		origin	▣	–	▣	–	–	–	–
		path	–	–	▣	–	–	–	–
		show	▣	▣	▣	–	–	–	–
		targetElement	▣	▣	▣	–	–	–	–
		to	▣	▣	▣	▣	–	–	–
		to	▣	▣	▣	–	–	–	–
		type	▣	▣	▣	–	–	–	–
		values	▣	▣	▣	–	–	–	–

Table B-1 (continued). SMIL implementation table.

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Functional Groups		Elements/Attributes	RealPlayer	Ambulant	GRiNS	Access	Daisy	Playlist	Ginga-NCL
	smilState	<state>	–	◈	◈	–	◈	–	–
		<setvalue>	–	◈	◈	–	◈	–	–
		<delvalue>	–	◈	◈	–	◈	–	–
		<newvalue>	–	◈	◈	–	◈	–	–
		<submission>	–	◈	◈	–	◈	–	–
		<send>	–	◈	◈	–	◈	–	–
		action	–	◈	◈	–	◈	–	–
		expr	–	◈	◈	–	◈	–	–
		language	–	◈	◈	–	◈	–	–
		method	–	◈	◈	–	◈	–	–
		name	–	◈	◈	–	◈	–	–
		ref	–	◈	◈	–	◈	–	–
		replace	–	◈	◈	–	◈	–	–
		submission	–	◈	◈	–	◈	–	–
		target	–	◈	◈	–	◈	–	–
		value	–	◈	◈	–	◈	–	–
		where	–	◈	◈	–	◈	–	–

Key:

◈ *Fully supported in given implementations*

◈ *Partially supported in given implementations*

– *Not supported (yet) in given implementations*

Notes:

1. Only fully transparent/opaque supported in Ambulant.
2. Not support on all platforms of Ambulant. See Ambulant documentation.
3. Only the default subtype per group is required to be supported.
4. Only one toLevel window supported in Ambulant.
5. Fit="scroll" not supported in Ambulant.

Table B-1 (continued). SMIL implementation table.

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