

SISO-PN-012-2014

**Product Nomination
for**

WebLVC Protocol

Version 1.0

13 August 2014

SAC Approved: 10/07/2014

EXCOM Approved: 10/07/2014

Copyright © 2014 by the Simulation Interoperability Standards Organization, Inc.

P.O. Box 781238
Orlando, FL 32878-1238, USA

All rights reserved.

Permission is hereby granted to quote any of the material herein, or to make copies thereof, for non-commercial purposes, as long as the proper attribution is made and this copyright notice is included. All other uses are prohibited without written permission from the SISO, Inc. Board of Directors.

SISO Inc. Board of Directors
P.O. Box 781238
Orlando, FL 32878-1238, USA

Revision History

Version	Section	Date (MM/DD/YYYY)	Description
V1.0	All	8/13/2014	original version

Table of Contents

1. Product title *	5
2. Proponent name(s) and contact information	5
3. Type of product(s) (*Balloted Products)	5
4. Product description	6
5. Identification of the community to which product applies	6
6. Problem(s) and/or issue(s) that the proposed product addresses	6
a) Provide details on the specific need or requirement for this product in the community.	6
b) Provide details on the discussion of the need for this product in the community.....	7
c) Have you investigated similar products in the community to ensure no overlap exists?	7
7. Indication of the maturity of the product	7
a) Detailed description on HOW the problem/issue will be solved (approach).....	7
b) Brief discussion on the maturity of the proposed product.	7
c) Brief discussion on alternative approaches to the proposed product.....	8
d) Provide examples of prototypes of the proposed product or reasons why this product will not be prototyped.....	8
e) What impact will the proposed product have on the M&S community?	8
f) What impact will this proposed product have on the SISO community?	8
g) What is the impact to the community on the LACK of this proposed product?	9
h) What are the domain implications for this proposed product?	9
i) State which SIW conference forum(s) take an active interest in the development of this proposed product?.....	9
8. Planned compliance testing	9
9. Schedule of product development milestones including reviews and reports	9
10. Candidate volunteers for the product development effort	10
11. Suggested product periodic review cycle (timeline)	11

SISO Product Nomination for WebLVC Protocol

SISO-PN-012-2014

1. Product title *

WebLVC Protocol

2. Proponent name(s) and contact information

First name: Len **Last name:** Granowetter
Affiliation: VT MAK
Street Address: 150 Cambridge Park Drive
City: Cambridge **State:** MA **Zip:** 02140
Phone #: 617 876-8085 x121 **Fax #:**
Email: lengrano@mak.com

Additional proponents:

Name	Organization	Email Address	Phone Numbers
Alharith Almusa	Boeing	alharith.a.almusa@boeing.com	
Ambuj Sinha	ASTI	ambuj.sinha@asti-usa.com	
Brad Dillman	VT MAK	bdillman@mak.com	
Brett Terry	Sonalysts	bterry@sonalysts.com	
Chris Gaughan	ARL STTC	christopher.j.gaughan.civ@mail.mil	
Chris Metevier	ARL STTC	chris.metevier@us.army.mil	
Colin Timmons	SECO Canada	p-otg.dndcafseco@intern.mil.ca	
Curt Schroeder	Antycip	curt.schroeder@antycipsimulation.com	
Don McGregor	NPS	mcgredo@nps.edu	
Jean-Louis Igarza	Antycip	jean-louis.igarza@antycipsimulation.com	
Jennifer Lewis	SAIC	jennifer.e.lewis@saic.com	
Joe McDonnell	DAS	jmcdonne@d-a-s.com	
Keith Snively	DAS	ksnively@d-a-s.com	
Kevin Eifenbein	ASTI	kevin.elfenbein@asti-usa.com	
Kevin Gupton	ARL UT	kgupton@arlut.utexas.edu	
Lance Marrou	SAIC	lance.r.marrou@leidos.com	
Paul Gustavson	SimVentions	pgustavson@simventions.com	
Rodney Long	ARL	rodney.long@us.army.mil	
Shagoto Nandi	VT MAK	snandi@mak.com	
Stephen Jones	SimPhonics	sjones@simphonics.com	

3. Type of product(s) (*Balloted Products)

X	Standard*
	Guidance*
	Reference
	Administrative

4. Product description

WebLVC is a protocol for enabling web and mobile applications (typically JavaScript applications running in a web browser) to play in traditional M&S federations (which may be using Distributed Interactive Simulation (DIS), High Level Architecture (HLA), Test and Training Enabling Architecture (TENA), or related protocols and architectures). In a nutshell, WebLVC takes the semantics of DIS or HLA Federation Object Models (FOMs), and represents them using messages in the JSON (JavaScript Object Notation) format, which are typically passed between server and client using WebSockets.

The SISO Standards Product will be produced in the format approved by the Standards Activity Committee (available here <http://www.sisostds.org/FormTemplates.aspx>). The SISO Standards Products will be published on the STANDARDS webpage.

The Standards Product will describe, in text form, the actual format of JSON-based messages that must be implemented by an application in order to be WebLVC-compliant. It will also describe the rules for exchanging these messages. JSON is a structured, text-based format (similar to XML), which lends itself to textual descriptions that can be included directly in a .pdf document.

The proposed Standard consists of:

- An object-model independent section, which defines the common message headers and object-model-independent administrative messages, and defines a template for the kinds of messages that express object-model-specific data.
- A Standard WebLVC Object Model section, which defines specific AttributeUpdate and Interaction messages (expressed in the JSON format), based on the semantics of the DIS protocol and the RPR FOM. The Standard WebLVC Object Model is designed to allow a-priori interoperability between web applications, and federates that are built on these common, existing simulation standards.
- A section describing the process and rules for hand-authoring new WebLVC messages based on extended or alternative object models.
- A section describing rules for automatically generating WebLVC messages directly from an HLA FOM.

In order to facilitate easy import into software development tools, the Standard will include (in addition to the main .pdf document), an Appendix which includes all of the WebLVC messages in a text-based JSON file.

The main body of the Standards Product, together with its Appendix, comprise a single SISO Standards Product.

5. Identification of the community to which product applies

Anyone who wants to develop web-based applications, and achieve interoperability with traditional M&S applications and federations – whether those applications are used for training, experimentation, analysis, or other purposes.

6. Problem(s) and/or issue(s) that the proposed product addresses

- a) **Provide details on the specific need or requirement for this product in the community.**

In recent years, several new technologies and standards have been developed in the broad Web community that enable highly-interactive, low-latency, real-time web-based

applications that run in a browser. Based on these technologies (WebSocket, WebGL, HTML5, etc.), it is now possible to develop web-based M&S applications like Plan View Displays, Stealth Viewers, Instructor Operator Stations, and even web-based flight simulators and first-person gaming applications. In fact, many companies and programs are doing exactly these things. However, there is currently no standard interoperability protocol for linking these new web-applications with each other, and with traditional M&S federations in a way that is:

- High-performance enough for the needs of these applications
- Natural to use in a JavaScript environment.
- Flexible enough to support interoperability regardless of the protocol being used in the target federation (e.g. DIS, HLA 1.3, HLA 1516, HLA Evolved, TENA, etc.)

It is important that SISO support a standard mechanism to achieve interoperability in this realm, so that multiple, gratuitously non-interoperable solutions don't quickly develop.

b) Provide details on the discussion of the need for this product in the community.

The WebLVC concept was studied by the SISO WebLVC Study group, which ran from 2012-2014. As stated in the Study Group Final Report (SISO-REF-051-2014 WebLVC SG Final Report approved 20140210.pdf), "In the end, there was a strong consensus to further develop the WebLVC concept and protocol, with the goal of developing it into a SISO Standard. The group's consensus recommendation was to form a WebLVC PDG for this purpose immediately.

c) Have you investigated similar products in the community to ensure no overlap exists?

Yes. The WebLVC Study Group investigated existing alternatives based on older technologies (e.g. the Web Services API in HLA Evolved), and concluded that no existing standard met the goals desired by the group. The group also included key members of the DIS and RPR FOM PDGs, among others. There was widespread agreement on what the relationship should be between these related standards: The DIS/RPR groups (and groups that develop other object models) define the semantics required by the users of these protocols; and the WebLVC group defines how to represent these semantics in a web-friendly way.

7. Indication of the maturity of the product

The lead proponents of the Study Group contributed an initial draft of a proposed WebLVC protocol. The Study Group evaluated the initial draft (and subsequent drafts), concluded that the proposed concept was the right direction to pursue, and recommended the formation of a SISO PDG to develop a standard, using the initial drafts as a starting point.

a) Detailed description on HOW the problem/issue will be solved (approach)

A WebLVC Standard would consist of a set of JSON messages representing a common set of semantics used by DIS/HLA federations, along with a set of rules for extending the Standard to support the semantics of additional simulation concepts (including rules for auto-generating WebLVC extensions from HLA FOMs)

b) Brief discussion on the maturity of the proposed product.

The WebLVC concept has matured significantly since the inception of the WebLVC Study Group. The WebLVC Protocol is used by numerous M&S organizations around the world. These include:

- VT MAK has launched a suite of commercial products that support the existing WebLVC protocol drafts, and hosts a free 24/7 WebLVC Testbed running in the cloud
- The US Air Force's AFMSTT Program (Air Force Modeling and Simulation Training Toolkit) has adopted the WebLVC protocol as the architecture for its web-based thin-clients
- The NATO ICOVICS Program has adopted WebLVC to develop a common GUI to control a variety of heterogeneous Semi-Automated Forces (SAF) applications
- AGI hosts an integrated of WebLVC with their WebGL-based Cesium product
- WebLVC has been integrated with Google Earth, OpenLayers, ArcGIS, and other 3rd-party web toolkits and engines
- WebLVC has been endorsed by key personnel at PEO STRI, STTC, and other US government agencies.
- WebLVC was used as the basis for a cloud-based traffic simulation service called TurboTraffic.

There are many open questions the PDG will have to answer (how to handle interest management, how many and which messages should be in the standard object model, etc.) But the basic concept has been proven.

c) Brief discussion on alternative approaches to the proposed product

Previous attempts to support web-based applications in M&S applications tended to be protocol-specific (i.e. worked with HLA Evolved only, or with DIS only), were not natural to use in JavaScript applications (i.e. required client-side data marshalling), and were based on low-performance transactional web-services approaches.

WebLVC is the first proposed standard that is based on the concept of high-performance bi-directional communication of simulation data between web clients and servers. No serious alternatives were proposed by members of the Study Group. Several members had already been developing approaches very similar to the WebLVC concept.

d) Provide examples of prototypes of the proposed product or reasons why this product will not be prototyped.

See list in section b) above. The WebLVC protocol has been heavily prototyped by VT MAK, and these products have been in use by numerous customers for up to two years. And we know of at least two other independent, yet interoperable implementations of WebLVC that do not use any VT MAK software. At a minimum, VT MAK intends to continue to prototype new drafts of the WebLVC Standard as they are developed by the PDG.

e) What impact will the proposed product have on the M&S community?

We think this standard will be critical to smooth adoption of web technology in the M&S community (whether on private networks or over the open internet). The Standard will allow web and mobile applications developed by different organizations to interoperate with each other, and with existing native M&S assets.

f) What impact will this proposed product have on the SISO community?

We think the impact will be quite positive. The standard is complementary to the DIS Standard, RPR FOM, and with HLA. The WebLVC PDG will provide an opportunity for

SISO members to learn about web technology – an area where the defense industry has traditionally been behind the majority of the software industry. Interest within SISO is high - a WebLVC meeting helped to anchor the 2014 SISO Spring Technical Interchange Meeting.

g) What is the impact to the community on the LACK of this proposed product?

Without a standard, various developers will come up with their own, non-interoperable solutions for how to get data between web-based federates and traditional M&S federation – exactly the kind of situation SISO typically helps to avoid.

h) What are the domain implications for this proposed product?

The idea is for the protocol to be general purpose - extensible (much in the way that HLA FOMs are) to cover various communities' semantics. But the intent is that there will be a built-in standard object model based on the semantics of DIS/RPR.

i) State which SIW conference forum(s) take an active interest in the development of this proposed product?

WebLVC is likely to generate the most interest in the Services, Processes, Tools, and Data Track.

8. Planned compliance testing

Nothing specific planned. This can be discussed by the PDG.

9. Schedule of product development milestones including reviews and reports

The Study Group's consensus was to develop "built-in" messages only for the subset of DIS/RPR FOM semantics that were commonly-enough used to justify manual development. Remaining semantics required by various users could be implemented by extending the WebLVC protocol "by hand" or through automatic generation based on HLA FOMs. This philosophy will help avoid a situation where a halfway done standard languished because no one volunteers to finish the standards development job. We believe we can have a complete draft ready for review and balloting by July 1, 2015.

Proposed schedule is as follows:

Date	Task
SEP 2014	WebLVC Study Group meeting at 2014 Fall SIW. Review and resolve comments received during the required 30-day SISO-Community Review of the draft Product Nomination. Revise draft PN and submit to SAC to process.
OCT-NOV 2014	Receive SAC and EXCOM approval of PN, form PDG. Organize PDG (elect officers, specify Draft Group members, etc.)
OCT 2014 – MAR 2015	Conduct monthly telecons; and drafting group activity to author a first official draft of the WebLVC Protocol Standard based on decisions made by the group during kickoff meeting and subsequent telecons. Produce minutes of telecons and meetings and post in PDG folder in SISO's Digital Library.
MAR-APR 2015	If one is conducted, meet at 2015 Spring Technical Interchange Meeting (TIM) to review first official draft WebLVC Protocol Standard
MAR-JUN 2015	Drafting group incorporates feedback from the Spring TEM review, and produces a draft Product ready for balloting.
JUL 2015	Post complete Circulation Package in PDG's Digital Library folder. Details found in SISO-ADM-003-2011 Section 4.3.3; if newer version is published requirements in that version are effective at the time Circulation Package is submitted. Notify SAC of request for approval to enter the ballot product phase and provide message with direct URLs for each piece of the Circulation Package.
AUG-SEP 2015	Ballot phase activities: SAC issue invitation to join the ballot group, PDG balance the ballot group, SAC conduct the ballot
SEP 2015	Meet at 2015 Fall SIW; begin addressing ballot comments; document all resolutions in Comment Tracking System (CTS)
SEP-DEC 2015	Continue ballot comment resolution; obtain ballot group member acceptance of comment resolutions; document in CTS; obtain final CTS spreadsheet and post in PDG's Digital Library folder.
JAN 2016	Post complete Product Approval Package in PDG's Digital Library Folder. Details found in SISO-ADM-003-2011, 4.4 Step Four: Product Approval; if newer version is published requirements in that version are effective at the time Product Approval Package is submitted.
FEB-MAR 2016	Obtain SAC and EXCOM approvals SAC publish new Standard
MAR-APR 2016	If one is conducted, meet at 2016 Spring Technical Interchange Meeting (TIM) to review draft Product Support Group (PSG) Terms of Reference (TOR), and to communicate to the community about the new standard
APR 2016	Provide draft PSG TOR to SAC for processing
APR-MAY 2016	Obtain SAC and EXCOM approvals SAC establish PSG resources; SAC archive PDG resources

10. Candidate volunteers for the product development effort

All of the proponents listed in Section 2 (as well as many others) have expressed an intent to participate in the WebLVC PDG. Volunteers to actually turn their ideas and contributions into a Standard document (i.e. editors) will be solicited at the PDG kickoff. At a minimum, the following PDG members have been serving as the editors of the existing "starting point" drafts, and are willing to continue to serve as editors as the PDG does its work.

Name	Organization	Email Address	Phone Numbers
Len Granowetter	VT MAK	lengrano@mak.com	
Brad Dillman	VT MAK	bdillman@mak.com	

11. Suggested product periodic review cycle (timeline)

The WebLVC PDG will conduct informal reviews of published products as new information becomes available, technology changes, etc., and process change requests through the PSG for future consideration in revised products.

The WebLVC PSG will conduct and document formal Periodic Reviews IAW SISO-ADM-002 and SISO-ADM-003 of this product at least every five years from the date of publication.