International Civil Aviation Organization

The Tenth Meeting of System Wide Information Management Task Force (SWIM TF/10) and Second Working Session of SIPG

Bangkok, Thailand, 20 – 30May 2025

Agenda Item 5: Updates on the assigned tasks by task leads/contributors, including progress report and issues
d) Governance
Task 5: Regional SWIM Governance Framework

COMPARISON OF SWIM DISCOVERY SERVICE(SDS) IMPLEMENTATION SPECIFICATION BETWEEN v1.0 AND v2.0

(Presented by SIPG, presenter ROK)

SUMMARY

This paper is documented to implement ACTION ITEM 9-13 and compares the differences between SWIM Discovery Service (SDS) implementation specifications v1.0 and v2.0

1. INTRODUCTION

1.1 The SWIM Discovery Service (SDS) is a web service that enables the exchange of metadata for a SWIM information service between independently managed SWIM programs.

1.2 At the APAC SWIM TF/8, WP/07 - "Proposal of Regional Candidate Standard for Service Discovery" proposed the SDS implementation specification as the regional specification to enable interoperable service discovery across the APAC region.

1.3 At the APAC SWIM TF/8, the TF adopted the **Draft Decision SWIM TF/08/01** – "Adoption of SWIM Discovery Service as a Global Standard for Globally Interoperable Service Discovery" and the **Draft Decision SWIM TF/08/02** – "Candidate Baseline SWIM Discovery Service Standard for Asia/Pacific".

1.4 At the APAC SWIM TF/9, WP/12 – "SWIM Discovery Service (SDS) Jump Starter Kit" introduces the SDS Jump Starter Kit developed by the ROK which is in align with the SDS specification v1.0 to contribute the better understanding and the global implementation of the SDS in the APAC region.

1.5 At the APAC SWIM TF/9, the TF requested to verify whether differences between SDS implementation specifications v1.0 and v2.0 would result in the update required for the developed SDS Jump Starter Kit and will share finding with the future SWIM TF meeting. **ACTION ITEM 9-13**

1.6 This paper is documented to implement ACTION ITEM 9-13 and compares the differences between SDS implementation specifications v1.0 and v2.0.

2. DISCUSSION

2.1 The basic comparison of concepts and objectives is shown in the table1:

Item	SDS Specification v1.0	SDS Specification v2.0
Purpose	Establish guidelines and general technical principles for the development of SWIM Discovery Services (SDS).	Improve SDS Specification to facilitate the federated discovery of aviation services within the global SWIM ecosystem.
Aim	Presents the enabling technologies and practices that support federated service discovery among independently developed and autonomously managed SDS implementations.	Aims to promote interoperability, standardization, and seamless service metadata exchange across various SWIM initiatives.
License	N/A (Not Defined)	Free to Use (Except Modification of Specification)
Status	Released (July, 2020)	Draft (March, 2024)
Contributor	United States FAA SWIM program in collaboration with the Korea Airports Corporation (KAC) of the Republic of Korea (ROK)	United States FAA SWIM program in collaboration with the APAC SWIM SDS Project Team

2.2 The technical comparison of resources and operations is shown in the table 2:

Item	SDS Specification v1.0	SDS Specification v2.0
Interface	REST API	REST API
Method	HTTP GET	HTTP GET
Resource	- /discovery-service - /peers - /services - /services/{service-id}	- /discovery-service - /discovery-service/peers - /discovery-service/services - /discovery-service/services/service-description/{service-id}
Payload	SHOULD	SHALL
	JSON	JSON
	MAY	
	XML	
Conceptual Schema	SDCM v.2.0	SDCM v.3.0
Implementational Schema	(JSON) SDM-J v.1.0.0	(JSON) SDM-J v.1.0.1 or higher
Status Code	RFC 7231 section 6	RFC 2616 section 6.1
	** Status Codes are mostly identical (e.g., 305 is depreciated in RFC 7231)*	
Request Header	SHALL	SHALL
	(SHOUL) Accept (application/json) (MAY) Accept (application/xml)	Accept Accept-Language (default English) Status Code
	SHOULD	SHOULD
	-	Accept-Encoding
	MAY	MAY
	Authorization	Authorization Cache-Control

<table>
<tr><td rowspan="4">Response Header</td><td>SHALL</td><td>SHALL</td></tr>
<tr><td rowspan="3">(SHOUL) Content-Type (application/json)
(MAY) Content-Type (application/xml)</td><td>Content-Type (application/json)
Accept-Language (default English)
Content-Encoding (if Accept-Encoding)</td></tr>
<tr><td>MAY</td></tr>
<tr><td>Content-Location
X-Total-Count</td></tr>
<tr><td rowspan="4">Caching</td><td rowspan="4">N/A
(Not Defined)</td><td>SHALL</td></tr>
<tr><td>- /discovery-service
- /discovery-service/peers</td></tr>
<tr><td>SHOULD</td></tr>
<tr><td>- /discovery-service/services
- /discovery-service/services/service-description/{service-id}</td></tr>
<tr><td rowspan="4">SDS Versioning</td><td rowspan="4">N/A
(Not Defined)</td><td>SHALL [Versioned (>= v2.0)]</td></tr>
<tr><td>http://example.com/v2/discovery-service</td></tr>
<tr><td>MAY [Unversioned (v1.x)]</td></tr>
<tr><td>http://example.com/discovery-service.</td></tr>
<tr><td rowspan="2">Security Mechanism</td><td>SHOULD (if required)</td><td>SHOULD (if required)</td></tr>
<tr><td>HTTPS (TLS/SSL)</td><td>HTTPS (TLS/SSL)</td></tr>
<tr><td rowspan="5">Authentication Mechanism (recommendation)</td><td>SHOULD (if required)</td><td>MAY NOT BE MOST SUITABLE</td></tr>
<tr><td rowspan="3">HTTP basic authentication
HTTP digest authentication
Token-based based authentication
(including OAuth 2.0 Framework)</td><td>HTTP basic authentication
HTTP digest authentication
Token-based based authentication
(w/o OAuth 2.0 Framework)</td></tr>
<tr><td>MORE EFFECTIVE APPROACH</td></tr>
<tr><td>OAuth 2.0 Framework</td></tr>
<tr><td colspan="2">* In the case of authentication mechanism, the SDS specification asserts that the identification of specific security protocols and regulations. Instead, it offers recommendations with the understanding that the responsibility for specifying and implementing SDS security measures should reside with organizations charged with establishing SWIM security standards, both regionally and globally. It is further anticipated that SDS developers will thoroughly review and incorporate any security measures recommended by these specialized entities into subsequent updates of this specification.</td></tr>
<tr><td rowspan="2">SDS Specification Compatibility (v1.0↔v2.0)</td><td colspan="2">unknown</td></tr>
<tr><td colspan="2">* The SDS v2.0 specification mentions alignment with SDCM 3.0, and while example code was written using SDM-J v1.0.1, but some elements from SDCM v3.0 (such as Profile > Geographical Extent) are not included in SDM-J v1.0.1, so it is required to check if a newer version of SDM-J (e.g., v1.0.2 or later) includes compatibility with SDCM 3.0</td></tr>
<tr><td>Service Overview Compatibility</td><td>(SDM-J v1.0) Mostly</td><td>(SDM-J v1.1) Mostly
See Appendix A</td></tr>
</table>

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;
b) discuss the difference and its significance; and
c) discuss any relevant matter as appropriate

Service Overview Mapping to SDM-J v1.0.1 /SDCM v3.0

Reference
* Service overview is defined in Table 4-1 : Information Service Overview, Manual on the System-wide Information Management (SWIM) Implementation (ICAO Doc10203)
* SDM-J v1.1 is defined in SDM-J v1.1 Schema (click link)
* SDCM v3.0 is defined in SDCM v3.0 Document (click link)

Guidance
* The information service overview should be provided, completed and aggregated in a SWIM registry in English. When an information service overview is used in a SWIM registry, it should follow the order of fields as presented in Table 5-1 of PANS-IM.

Remark
* The SDS v2.0 specification mentions alignment with SDCM 3.0, and while example code was written using SDM-J v1.0.1, but some elements from SDCM v3.0 (such as Profile > Geographical Extent) are not included in SDM-J v1.0.1, and SDCM v3.0 also doesn't includes some of fields defined in the Service Overview, so it is required to check if a newer version of SDM-J (e.g., v1.0.2 or later) includes compatibility with SDCM 3.0 or Service Overview.

Service Overview		SDM-J v1.1 / SDCM v3.0
Field Name	Field Schema	Implementation

Information service Name (M)	Free text	SDM-J v1.1 > services (http://swim.aero/sds/1.0.1/services.json)
		
		(…)
		"name": {
		"description": "The full name and acronym of the service.",
		"type": "string"
		}
		(…)
		
		SDM-J v1.1> profile (discovery.swim.aero/sds/1.0.1/profile.json)
		
		(…)
		"name": {
		"description": "The full name (and acronym, if any) of the service.",
		"type": "string"
		}
		(…)

Information service version (M)	n.n[.n]	SDM-J v1.1 > profile (discovery.swim.aero/sds/1.0.1/profile.json)
		
		(…)
		"version": {
		"description": "The current version or revision level of the service.",
		"type": "string"
		}
		(…)

		** Versioning convention follows SWIM-005, FAA SOFTWARE SPECIFICATION Artifacts Versioning for SWIM-enabled Services*

Information service lifecycle status (M)	Prospective
	or
	Operational
	or
	Retired
		SDM-J v1.1 > services (http://swim.aero/sds/1.0.1/services.json)
		
		(…)
		"service-availability-status": {
		"type": "object",
		"properties": {
		"name": {
		"type": "string",
		"default": "Service Availability Status"
		},

		"taxonomy": {
		"type": "string",
		"format": "uri",
		"default": "http://semantics.aero/availability-status"
		},
		"code": {
		"type": "string",
		"format": "uri"
		}
		(…)

		* *Taxonomy is defined in* *http://semantics.aero/interface-type*

Information service Functions (O)	Free text *or* NIL	SDM-J v1.1> profile(discovery.swim.aero/sds/1.0.1/profile.json)
		
		(…)
		"function": {
		"description": "A type of activity describing the functionality of the service.",
		"type": "array",
		"items": {
		"type": "object",
		"properties": {
		"description": {
		"description": "A description of the function.",
		"type": "string"
		},
		"real-world-effect": {
		"description": "An ultimate purpose associated with the interaction with the service. It may be the response to a request for information or the change in the state of some entities shared between the participants in the interaction.",
		"type": "string"
		}
		}
		(…)

Information category (M)	Flight information;
	and/or
	Aeronautical information
	and/or
	Meteorological information
	and/or
	Environment information
	and/or
	Capacity demand and flow information
	and/or
	Surveillance information
	and/or
	Other information
		SDM-J v1.1 > services (http://swim.aero/sds/1.0.1/services.json)
		
		(…)
		"service-category": {
		"type": "array",
		"items": {
		"type": "object",
		"properties": {
		"name": {
		"type": "string",
		"default": "SWIM Service Category"
		},
		"taxonomy": {
		"type": "string",
		"format": "uri",
		"default": "http://semantics.aero/service-category"
		},
		"code": {
		"type": "string",
		"format": "uri"
		}
		(…)

		* *Taxonomy is defined in* *http://semantics.aero/service-category*
Brief description of the information service (M)	Free text (intended use)	SDM-J v1.1 > services (http://swim.aero/sds/1.0.1/services.json) (…) "description": { "description": "Brief description of the service.", "type": "string"

		} (…)

Additional information on the information service (O)	Free text
	or NIL
		SDM-J v1.1 > services (http://swim.aero/sds/1.0.1/profile.json)
		
		(…)
		"description": {
		"description": " A textual description of the service.",
		"type": "string"
		}
		(…)

Quality of the service (M)	CAPACITY:
	Free text (description of capacity)
	and/or
	TIME BEHAVIOUR:
	Free text (description of time behaviour)
	and/or
	AVAILABILITY:
	Free text (description of availability)
	and/or
	RECOVERABILITY:
	Free text (description of recoverability)
	and/or
	INTEGRITY:
	Free text (description of integrity)
	and/or
	CONFIDENTIALITY:
	Free text (description of confidentiality)
		SDM-J v1.1 > services (http://swim.aero/sds/1.0.1/profile.json)
		
		(…)
		"quality-of-service": {
		"description": "A set of parameters that specify and measure the value of the provided service.",
		"type": "array",
		"items": {
		"type": "object",
		"properties": {
		"name": {
		"description": "The name of the quality of service parameter. Examples include: capacity, response time, etc.",
		"type": "string"
		},
		"value": {
		"description": "The value or range of values that the quality of service parameter is expected to meet or possess.",
		"type": "string"
		},
		"description": {
		"description": "A description of the quality of service parameter.",
		"type": "string"
		},
		"calculation-method": {
		"description": "A description of how the quality of service parameter values are measured or calculated.",
		"type": "string"
		},
		"unit-of-measure": {
		"description": "The unit of measure in which the quality of service parameter values are expressed.",
		"type": "string"
		}
		},
		(…)

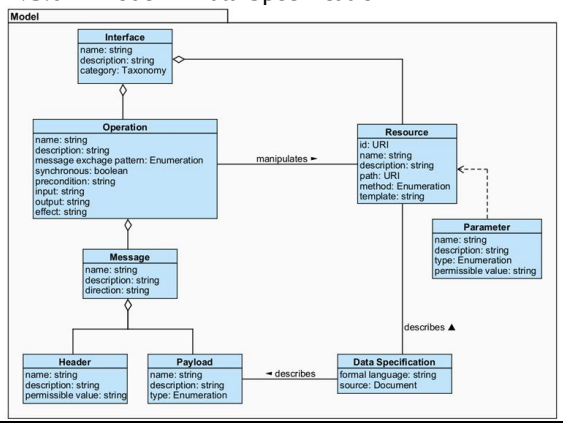
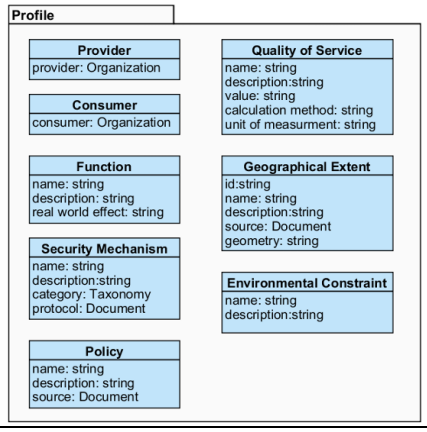
Access restrictions (M)	Free text	SDM-J v1.1> profile(discovery.swim.aero/sds/1.0.1/profile.json) (…) "security-mechanism": { "description": "A process (or a device incorporating such a process) that is utilized or implemented by the service in order to address a security threat.",

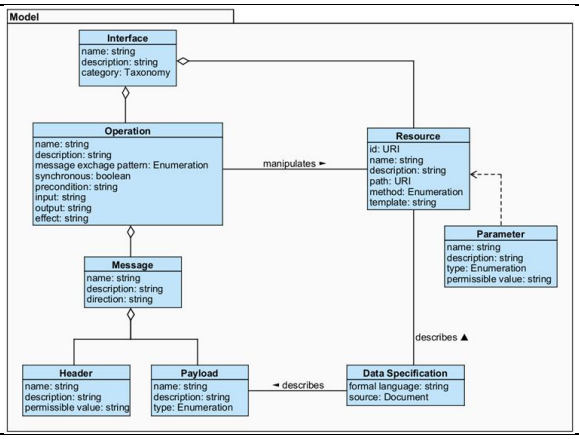
<table>
<tr><td></td><td></td><td>"type": "array",
"items": {
"type": "object",
"properties": {
"name": {
"description": "The name of the security mechanism.",
"type": "string"
},
"description": {
"description": "A description of the security mechanism.",
"type": "string"
},
"protocol": {
"description": "A document that defines and prescribes the usage of the security mechanism.",
"$ref": "https://swim.aero/sdm-j/1.0.1/document.json#/definitions/document"
}
}
}
},
(…)</td></tr>
<tr><td rowspan="2">Message exchange patterns (M)</td><td rowspan="2">Request/reply
and/or
One way
and/or
Publish/subscribe</td><td>SDM-J v1.1 > services (http://swim.aero/sds/1.0.1/services.json)
(…)
"interface-type": {
"type": "object",
"properties": {
"name": {
"type": "string",
"default": "Service Interface Type"
},
"taxonomy": {
"type": "string",
"default": "http://semantics.aero/interface-type"
},
"code": {
"type": "string",
"format": "uri"
}
}
}
(…)</td></tr>
<tr><td>* Taxonomy is defined in
http://semantics.aero/interface-type</td></tr>
<tr><td>Provider organisation (M)</td><td rowspan="2">Free text</td><td rowspan="2">SDM-J v1.1> profile(discovery.swim.aero/sds/1.0.1/profile.json)

(…)
"provider": {
"type": "object",
"description": "The organization that offers the use of capabilities by means of the service.",
"minimum": 1,
"maximum": 1,
"$ref": "https://swim.aero/sdm-j/1.0.1/organization.json#/definitions/organization"
},
(…)
SDM-J v1.1> organization
(discovery.swim.aero/sds/1.0.1/organization.json)

(…)
"organization": {
"type": "object",
"properties": {
"name": {</td></tr>
<tr><td>Provider’s point of Contact Information (M)</td></tr>
</table>

		"type": "string"
		},
		"description": {
		"type": "string"
		},
		"website": {
		"type": "string"
		},
		"point-of-contact": {
		"type": "array",
		"items": [
		{
		"type": "object",
		"properties": {
		"name": {
		"type": "string"
		},
		"function": {
		"type": "string"
		},
		"email": {
		"type": "string"
		}
		(…)

Information exchange Models (M)	Free text	SDCM v3.0 > Model > Data Specification 
Geographical extent of information (M)	Free text	SDCM v3.0 > Profile > Geographical Extent 
Filtering available (O)	Free text *or* NIL	SDCM v3.0 > Model > Parameter

		
Support availability (M)	Free text or NO SUPPORT AVAILABLE	-
Information service lifecycle date (O)	YYYY-MM-DD *or* NIL	-
Information service validation type (M)	Independent validation *and/or* Collaborative validation *and/or* User validation *and/or* Self-validation	-
Information service validation description (M)	Free text (validation result)	-
Sources of Information (O)	Free text *or* NIL	
Information security category (M)	None *or* Basic *or* Intermediate *or* Advanced	-

[Appendix B]

Service Description Example Described in SDS v2.0 Specification (/discovery-service/services/service-description)


```
{
 "services-description": [
  {
   "service-id": "https://nsrr.faa.gov/services/fps",
   "name": "Flight Plan Service (FPS)",
   "version": "1.0.0",
   "description": "A service for filing, updating, or canceling a flight plan.",
   "categories": [
    {
     "category": "SWIM Service Category",
     "links": [
      {
       "rel": "describedby",
       "href": "http://semantics.aero/service-category",
       "title": "SWIM Service Category",
       "type": "text/html",
       "language": "en"
      },
      {
       "rel": "code",
       "href": "http://semantics.aero/service-category#flight",
       "title": "Flight",
       "type": "text/html"
      }
     ]
    },
    {
     "category": "Service Availability Status",
     "links": [
      {
       "rel": "describedby",
       "href": "http://semantics.aero/availability-status",
       "title": "Service Availability Status",
       "type": "text/html",
       "language": "en"
      },
      {
       "rel": "code",
       "href": "http://semantics.aero/availability-status#prospective",
       "title": "Prospective",
       "type": "text/html"
      },
      {
       "rel": "code",
       "href": "http://semantics.aero/availability-status#operational",
       "title": "Operational",
       "type": "text/html"
      }
     ]
    },
    {
     "category": "Service Interface Type",
     "links": [
      {
```

```
      "rel": "describedby",
      "href": "http://semantics.aero/interface-type",
      "title": "Service Interface Type",
      "type": "text/html",
      "language": "en"
     },
     {
      "rel": "code",
      "href": "http://semantics.aero/interface-type#method-oriented",
      "title": "Method-Oriented",
      "type": "text/html"
     }
    ]
   }
  ],
  "profile": {// Data for the profile object is here.},
  "model": {// Data for the profile object is here.},
  "grounding": {// Data for the profile object is here.}
 }
// Additional service-descriptions could be added here.
]
}
```