

SACM  
Internet-Draft  
Intended status: Standards Track  
Expires: March 13, 2017

D. Waltermire, Ed.  
NIST  
K. Watson  
DHS  
C. Kahn  
L. Lorenzin  
Pulse Secure, LLC  
M. Cokus  
D. Haynes  
The MITRE Corporation  
H. Birkholz  
Fraunhofer SIT  
September 9, 2016

**SACM Information Model**  
**draft-ietf-sacm-information-model-07**

Abstract

This document defines the Information Elements that are transported between SACM components and their interconnected relationships. The primary purpose of the Secure Automation and Continuous Monitoring (SACM) Information Model is to ensure the interoperability of corresponding SACM data models and addresses the use cases defined by SACM. The Information Elements and corresponding types are maintained as the IANA "SACM Information Elements" registry.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on March 13, 2017.

Copyright Notice

Copyright (c) 2016 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

- [1. Introduction](#) . . . . . [12](#)
- [2. Conventions used in this document](#) . . . . . [13](#)
  - [2.1. Requirements Language](#) . . . . . [13](#)
  - [2.2. Information Element Examples](#) . . . . . [13](#)
- [3. Information Elements](#) . . . . . [13](#)
  - [3.1. Context of Information Elements](#) . . . . . [13](#)
  - [3.2. Extensibility of Information Elements](#) . . . . . [14](#)
- [4. Structure of Information Elements](#) . . . . . [14](#)
  - [4.1. Information Element Naming Convention](#) . . . . . [17](#)
  - [4.2. SACM Content Elements](#) . . . . . [17](#)
  - [4.3. SACM Statements](#) . . . . . [18](#)
  - [4.4. Relationships](#) . . . . . [20](#)
  - [4.5. Event](#) . . . . . [22](#)
  - [4.6. Categories](#) . . . . . [23](#)
- [5. Abstract Data Types](#) . . . . . [23](#)
  - [5.1. Simple Datatypes](#) . . . . . [23](#)
    - [5.1.1. IPFIX Datatypes](#) . . . . . [23](#)
  - [5.2. Structured Datatypes](#) . . . . . [24](#)
    - [5.2.1. List Datatypes](#) . . . . . [24](#)
    - [5.2.2. Enumeration Datatype](#) . . . . . [25](#)
- [6. Information Model Assets](#) . . . . . [26](#)
  - [6.1. Asset](#) . . . . . [27](#)
  - [6.2. Endpoint](#) . . . . . [27](#)
  - [6.3. Hardware Component](#) . . . . . [28](#)
  - [6.4. Software Component](#) . . . . . [28](#)
    - [6.4.1. Software Instance](#) . . . . . [28](#)
  - [6.5. Identity](#) . . . . . [29](#)
  - [6.6. Guidance](#) . . . . . [29](#)
    - [6.6.1. Collection Guidance](#) . . . . . [29](#)
    - [6.6.2. Evaluation Guidance](#) . . . . . [30](#)
    - [6.6.3. Classification Guidance](#) . . . . . [30](#)



6.6.4.	Storage Guidance	31
6.6.5.	Evaluation Results	31
7.	Information Model Elements	31
7.1.	accessPrivilegeType	31
7.2.	accountName	32
7.3.	administrativeDomainType	32
7.4.	addressAssociationType	32
7.5.	addressMaskValue	32
7.6.	addressType	32
7.7.	addressValue	33
7.8.	applicationComponent	33
7.9.	applicationLabel	33
7.10.	applicationType	33
7.11.	applicationManufacturer	33
7.12.	authenticator	34
7.13.	authenticationType	34
7.14.	birthdate	34
7.15.	bytesReceived	34
7.16.	bytesSent	34
7.17.	bytesSent	35
7.18.	certificate	35
7.19.	collectionTaskType	35
7.20.	confidence	35
7.21.	contentAction	36
7.22.	countryCode	36
7.23.	dataOrigin	36
7.24.	dataSource	36
7.25.	default-depth	36
7.26.	discoverer	37
7.27.	emailAddress	37
7.28.	eventType	37
7.29.	eventThreshold	37
7.30.	eventThresholdName	37
7.31.	eventTrigger	38
7.32.	eventTrigger	38
7.33.	firmwareId	38
7.34.	hostName	38
7.35.	interfaceLabel	39
7.36.	ipv6AddressSubnetMask	39
7.37.	ipv6AddressSubnetMaskCidrNotation	39
7.38.	ipv6AddressValue	39
7.39.	ipv4AddressSubnetMask	39
7.40.	ipv4AddressSubnetMaskCidrNotation	39
7.41.	ipv4AddressValue	40
7.42.	layer2InterfaceType	40
7.43.	layer4PortAddress	40
7.44.	layer4Protocol	40
7.45.	locationName	40



<a href="#">7.46</a>	<a href="#">macAddressValue</a>	<a href="#">41</a>
<a href="#">7.47</a>	<a href="#">methodLabel</a>	<a href="#">41</a>
<a href="#">7.48</a>	<a href="#">methodRepository</a>	<a href="#">41</a>
<a href="#">7.49</a>	<a href="#">networkAccessLevelType</a>	<a href="#">41</a>
<a href="#">7.50</a>	<a href="#">networkId</a>	<a href="#">42</a>
<a href="#">7.51</a>	<a href="#">networkInterfaceName</a>	<a href="#">42</a>
<a href="#">7.52</a>	<a href="#">networkLayer</a>	<a href="#">42</a>
<a href="#">7.53</a>	<a href="#">networkName</a>	<a href="#">42</a>
<a href="#">7.54</a>	<a href="#">organizationId</a>	<a href="#">42</a>
<a href="#">7.55</a>	<a href="#">osComponent</a>	<a href="#">43</a>
<a href="#">7.56</a>	<a href="#">osLabel</a>	<a href="#">43</a>
<a href="#">7.57</a>	<a href="#">osName</a>	<a href="#">43</a>
<a href="#">7.58</a>	<a href="#">osType</a>	<a href="#">43</a>
<a href="#">7.59</a>	<a href="#">osVersion</a>	<a href="#">43</a>
<a href="#">7.60</a>	<a href="#">patchId</a>	<a href="#">44</a>
<a href="#">7.61</a>	<a href="#">patchName</a>	<a href="#">44</a>
<a href="#">7.62</a>	<a href="#">personFirstName</a>	<a href="#">44</a>
<a href="#">7.63</a>	<a href="#">personLastName</a>	<a href="#">44</a>
<a href="#">7.64</a>	<a href="#">personMiddleName</a>	<a href="#">44</a>
<a href="#">7.65</a>	<a href="#">phoneNumber</a>	<a href="#">44</a>
<a href="#">7.66</a>	<a href="#">phoneNumberType</a>	<a href="#">45</a>
<a href="#">7.67</a>	<a href="#">privilegeName</a>	<a href="#">45</a>
<a href="#">7.68</a>	<a href="#">privilegeValue</a>	<a href="#">45</a>
<a href="#">7.69</a>	<a href="#">protocol</a>	<a href="#">45</a>
<a href="#">7.70</a>	<a href="#">publicKey</a>	<a href="#">46</a>
<a href="#">7.71</a>	<a href="#">relationshipContentElementGuid</a>	<a href="#">46</a>
<a href="#">7.72</a>	<a href="#">relationshipStatementElementGuid</a>	<a href="#">46</a>
<a href="#">7.73</a>	<a href="#">relationshipObjectLabel</a>	<a href="#">46</a>
<a href="#">7.74</a>	<a href="#">relationshipType</a>	<a href="#">46</a>
<a href="#">7.75</a>	<a href="#">roleName</a>	<a href="#">47</a>
<a href="#">7.76</a>	<a href="#">sessionStateType</a>	<a href="#">47</a>
<a href="#">7.77</a>	<a href="#">statementGuid</a>	<a href="#">47</a>
<a href="#">7.78</a>	<a href="#">statementType</a>	<a href="#">47</a>
<a href="#">7.79</a>	<a href="#">status</a>	<a href="#">48</a>
<a href="#">7.80</a>	<a href="#">subAdministrativeDomain</a>	<a href="#">48</a>
<a href="#">7.81</a>	<a href="#">subInterfaceLabel</a>	<a href="#">48</a>
<a href="#">7.82</a>	<a href="#">superAdministrativeDomain</a>	<a href="#">48</a>
<a href="#">7.83</a>	<a href="#">superInterfaceLabel</a>	<a href="#">49</a>
<a href="#">7.84</a>	<a href="#">teAssessmentState</a>	<a href="#">49</a>
<a href="#">7.85</a>	<a href="#">teLabel</a>	<a href="#">49</a>
<a href="#">7.86</a>	<a href="#">teId</a>	<a href="#">49</a>
<a href="#">7.87</a>	<a href="#">timestampType</a>	<a href="#">49</a>
<a href="#">7.88</a>	<a href="#">unitsReceived</a>	<a href="#">50</a>
<a href="#">7.89</a>	<a href="#">unitsSent</a>	<a href="#">50</a>
<a href="#">7.90</a>	<a href="#">username</a>	<a href="#">50</a>
<a href="#">7.91</a>	<a href="#">userDirectory</a>	<a href="#">50</a>
<a href="#">7.92</a>	<a href="#">userId</a>	<a href="#">51</a>
<a href="#">7.93</a>	<a href="#">webSite</a>	<a href="#">51</a>



<a href="#">7.94.</a>	WGS84Longitude	<a href="#">51</a>
<a href="#">7.95.</a>	WGS84Latitude	<a href="#">51</a>
<a href="#">7.96.</a>	WGS84Altitude	<a href="#">51</a>
<a href="#">7.97.</a>	hardwareSerialNumber	<a href="#">52</a>
<a href="#">7.98.</a>	interfaceName	<a href="#">52</a>
<a href="#">7.99.</a>	interfaceIndex	<a href="#">52</a>
<a href="#">7.100.</a>	interfaceMacAddress	<a href="#">52</a>
<a href="#">7.101.</a>	interfaceType	<a href="#">53</a>
<a href="#">7.102.</a>	interfaceFlags	<a href="#">53</a>
<a href="#">7.103.</a>	networkInterface	<a href="#">53</a>
<a href="#">7.104.</a>	softwareIdentifier	<a href="#">54</a>
<a href="#">7.105.</a>	softwareTitle	<a href="#">54</a>
<a href="#">7.106.</a>	softwareCreator	<a href="#">54</a>
<a href="#">7.107.</a>	simpleSoftwareVersion	<a href="#">54</a>
<a href="#">7.108.</a>	rpmSoftwareVersion	<a href="#">54</a>
<a href="#">7.109.</a>	ciscoTrainSoftwareVersion	<a href="#">55</a>
<a href="#">7.110.</a>	softwareVersion	<a href="#">55</a>
<a href="#">7.111.</a>	lastUpdated	<a href="#">55</a>
<a href="#">7.112.</a>	softwareInstance	<a href="#">55</a>
<a href="#">7.113.</a>	globallyUniqueIdentifier	<a href="#">56</a>
<a href="#">7.114.</a>	dataOrigin	<a href="#">56</a>
<a href="#">7.115.</a>	dataSource	<a href="#">56</a>
<a href="#">7.116.</a>	creationTimestamp	<a href="#">56</a>
<a href="#">7.117.</a>	collectionTimestamp	<a href="#">56</a>
<a href="#">7.118.</a>	publicationTimestamp	<a href="#">57</a>
<a href="#">7.119.</a>	relayTimestamp	<a href="#">57</a>
<a href="#">7.120.</a>	storageTimestamp	<a href="#">57</a>
<a href="#">7.121.</a>	type	<a href="#">57</a>
<a href="#">7.122.</a>	protocolIdentifier	<a href="#">57</a>
<a href="#">7.123.</a>	sourceTransportPort	<a href="#">58</a>
<a href="#">7.124.</a>	sourceIPv4PrefixLength	<a href="#">58</a>
<a href="#">7.125.</a>	ingressInterface	<a href="#">58</a>
<a href="#">7.126.</a>	destinationTransportPort	<a href="#">59</a>
<a href="#">7.127.</a>	sourceIPv6PrefixLength	<a href="#">59</a>
<a href="#">7.128.</a>	sourceIPv4Prefix	<a href="#">59</a>
<a href="#">7.129.</a>	destinationIPv4Prefix	<a href="#">59</a>
<a href="#">7.130.</a>	sourceMacAddress	<a href="#">60</a>
<a href="#">7.131.</a>	ipVersion	<a href="#">60</a>
<a href="#">7.132.</a>	interfaceDescription	<a href="#">60</a>
<a href="#">7.133.</a>	applicationDescription	<a href="#">60</a>
<a href="#">7.134.</a>	applicationId	<a href="#">60</a>
<a href="#">7.135.</a>	applicationName	<a href="#">61</a>
<a href="#">7.136.</a>	exporterIPv4Address	<a href="#">61</a>
<a href="#">7.137.</a>	exporterIPv6Address	<a href="#">61</a>
<a href="#">7.138.</a>	portId	<a href="#">61</a>
<a href="#">7.139.</a>	templateId	<a href="#">61</a>
<a href="#">7.140.</a>	collectorIPv4Address	<a href="#">62</a>
<a href="#">7.141.</a>	collectorIPv6Address	<a href="#">62</a>





<a href="#">7.142</a>	<a href="#">informationElementIndex</a>	<a href="#">62</a>
<a href="#">7.143</a>	<a href="#">informationElementId</a>	<a href="#">63</a>
<a href="#">7.144</a>	<a href="#">informationElementDataType</a>	<a href="#">63</a>
<a href="#">7.145</a>	<a href="#">informationElementDescription</a>	<a href="#">63</a>
<a href="#">7.146</a>	<a href="#">informationElementName</a>	<a href="#">64</a>
<a href="#">7.147</a>	<a href="#">informationElementRangeBegin</a>	<a href="#">64</a>
<a href="#">7.148</a>	<a href="#">informationElementRangeEnd</a>	<a href="#">64</a>
<a href="#">7.149</a>	<a href="#">informationElementSemantics</a>	<a href="#">65</a>
<a href="#">7.150</a>	<a href="#">informationElementUnits</a>	<a href="#">65</a>
<a href="#">7.151</a>	<a href="#">userName</a>	<a href="#">66</a>
<a href="#">7.152</a>	<a href="#">applicationCategoryName</a>	<a href="#">66</a>
<a href="#">7.153</a>	<a href="#">mibObjectValueInteger</a>	<a href="#">66</a>
<a href="#">7.154</a>	<a href="#">mibObjectValueOctetString</a>	<a href="#">67</a>
<a href="#">7.155</a>	<a href="#">mibObjectValueOID</a>	<a href="#">67</a>
<a href="#">7.156</a>	<a href="#">mibObjectValueBits</a>	<a href="#">68</a>
<a href="#">7.157</a>	<a href="#">mibObjectValueIPAddress</a>	<a href="#">68</a>
<a href="#">7.158</a>	<a href="#">mibObjectValueCounter</a>	<a href="#">69</a>
<a href="#">7.159</a>	<a href="#">mibObjectValueGauge</a>	<a href="#">69</a>
<a href="#">7.160</a>	<a href="#">mibObjectValueTimeTicks</a>	<a href="#">70</a>
<a href="#">7.161</a>	<a href="#">mibObjectValueUnsigned</a>	<a href="#">70</a>
<a href="#">7.162</a>	<a href="#">mibObjectValueTable</a>	<a href="#">70</a>
<a href="#">7.163</a>	<a href="#">mibObjectValueRow</a>	<a href="#">71</a>
<a href="#">7.164</a>	<a href="#">mibObjectIdentifier</a>	<a href="#">71</a>
<a href="#">7.165</a>	<a href="#">mibSubIdentifier</a>	<a href="#">72</a>
<a href="#">7.166</a>	<a href="#">mibIndexIndicator</a>	<a href="#">72</a>
<a href="#">7.167</a>	<a href="#">mibCaptureTimeSemantics</a>	<a href="#">73</a>
<a href="#">7.168</a>	<a href="#">mibContextEngineID</a>	<a href="#">74</a>
<a href="#">7.169</a>	<a href="#">mibContextName</a>	<a href="#">75</a>
<a href="#">7.170</a>	<a href="#">mibObjectName</a>	<a href="#">75</a>
<a href="#">7.171</a>	<a href="#">mibObjectDescription</a>	<a href="#">75</a>
<a href="#">7.172</a>	<a href="#">mibObjectSyntax</a>	<a href="#">75</a>
<a href="#">7.173</a>	<a href="#">mibModuleName</a>	<a href="#">75</a>
<a href="#">7.174</a>	<a href="#">interface</a>	<a href="#">76</a>
<a href="#">7.175</a>	<a href="#">interfaceName</a>	<a href="#">76</a>
<a href="#">7.176</a>	<a href="#">iflisteners</a>	<a href="#">76</a>
<a href="#">7.177</a>	<a href="#">physicalProtocol</a>	<a href="#">76</a>
<a href="#">7.178</a>	<a href="#">hwAddress</a>	<a href="#">78</a>
<a href="#">7.179</a>	<a href="#">programName</a>	<a href="#">78</a>
<a href="#">7.180</a>	<a href="#">userId</a>	<a href="#">78</a>
<a href="#">7.181</a>	<a href="#">inetlisteningserver</a>	<a href="#">78</a>
<a href="#">7.182</a>	<a href="#">transportProtocol</a>	<a href="#">78</a>
<a href="#">7.183</a>	<a href="#">localAddress</a>	<a href="#">79</a>
<a href="#">7.184</a>	<a href="#">localPort</a>	<a href="#">79</a>
<a href="#">7.185</a>	<a href="#">localFullAddress</a>	<a href="#">79</a>
<a href="#">7.186</a>	<a href="#">foreignAddress</a>	<a href="#">79</a>
<a href="#">7.187</a>	<a href="#">foreignFullAddress</a>	<a href="#">79</a>
<a href="#">7.188</a>	<a href="#">selinuxboolean</a>	<a href="#">80</a>
<a href="#">7.189</a>	<a href="#">selinuxName</a>	<a href="#">80</a>



<a href="#">7.190</a>	<a href="#">currentStatus</a>	<a href="#">80</a>
<a href="#">7.191</a>	<a href="#">pendingStatus</a>	<a href="#">80</a>
<a href="#">7.192</a>	<a href="#">selinuxsecuritycontext</a>	<a href="#">80</a>
<a href="#">7.193</a>	<a href="#">filepath</a>	<a href="#">81</a>
<a href="#">7.194</a>	<a href="#">path</a>	<a href="#">81</a>
<a href="#">7.195</a>	<a href="#">filename</a>	<a href="#">81</a>
<a href="#">7.196</a>	<a href="#">pid</a>	<a href="#">81</a>
<a href="#">7.197</a>	<a href="#">role</a>	<a href="#">82</a>
<a href="#">7.198</a>	<a href="#">domainType</a>	<a href="#">82</a>
<a href="#">7.199</a>	<a href="#">lowSensitivity</a>	<a href="#">82</a>
<a href="#">7.200</a>	<a href="#">lowCategory</a>	<a href="#">82</a>
<a href="#">7.201</a>	<a href="#">highSensitivity</a>	<a href="#">82</a>
<a href="#">7.202</a>	<a href="#">highCategory</a>	<a href="#">83</a>
<a href="#">7.203</a>	<a href="#">rawlowSensitivity</a>	<a href="#">83</a>
<a href="#">7.204</a>	<a href="#">rawlowCategory</a>	<a href="#">83</a>
<a href="#">7.205</a>	<a href="#">rawhighSensitivity</a>	<a href="#">83</a>
<a href="#">7.206</a>	<a href="#">rawhighCategory</a>	<a href="#">83</a>
<a href="#">7.207</a>	<a href="#">systemdunitdependency</a>	<a href="#">84</a>
<a href="#">7.208</a>	<a href="#">unit</a>	<a href="#">84</a>
<a href="#">7.209</a>	<a href="#">dependency</a>	<a href="#">84</a>
<a href="#">7.210</a>	<a href="#">systemdunitproperty</a>	<a href="#">84</a>
<a href="#">7.211</a>	<a href="#">property</a>	<a href="#">84</a>
<a href="#">7.212</a>	<a href="#">systemdunitValue</a>	<a href="#">85</a>
<a href="#">7.213</a>	<a href="#">file</a>	<a href="#">85</a>
<a href="#">7.214</a>	<a href="#">fileType</a>	<a href="#">85</a>
<a href="#">7.215</a>	<a href="#">groupId</a>	<a href="#">85</a>
<a href="#">7.216</a>	<a href="#">aTime</a>	<a href="#">85</a>
<a href="#">7.217</a>	<a href="#">changeTime</a>	<a href="#">86</a>
<a href="#">7.218</a>	<a href="#">mTime</a>	<a href="#">86</a>
<a href="#">7.219</a>	<a href="#">size</a>	<a href="#">86</a>
<a href="#">7.220</a>	<a href="#">suid</a>	<a href="#">86</a>
<a href="#">7.221</a>	<a href="#">sgid</a>	<a href="#">86</a>
<a href="#">7.222</a>	<a href="#">sticky</a>	<a href="#">87</a>
<a href="#">7.223</a>	<a href="#">hasExtendedAcl</a>	<a href="#">87</a>
<a href="#">7.224</a>	<a href="#">inetd</a>	<a href="#">87</a>
<a href="#">7.225</a>	<a href="#">serverProgram</a>	<a href="#">87</a>
<a href="#">7.226</a>	<a href="#">endpointType</a>	<a href="#">88</a>
<a href="#">7.227</a>	<a href="#">execAsUser</a>	<a href="#">88</a>
<a href="#">7.228</a>	<a href="#">waitStatus</a>	<a href="#">88</a>
<a href="#">7.229</a>	<a href="#">inetAddr</a>	<a href="#">89</a>
<a href="#">7.230</a>	<a href="#">netmask</a>	<a href="#">89</a>
<a href="#">7.231</a>	<a href="#">passwordInfo</a>	<a href="#">89</a>
<a href="#">7.232</a>	<a href="#">username</a>	<a href="#">90</a>
<a href="#">7.233</a>	<a href="#">password</a>	<a href="#">90</a>
<a href="#">7.234</a>	<a href="#">gcos</a>	<a href="#">90</a>
<a href="#">7.235</a>	<a href="#">homeDir</a>	<a href="#">90</a>
<a href="#">7.236</a>	<a href="#">loginShell</a>	<a href="#">90</a>
<a href="#">7.237</a>	<a href="#">lastLogin</a>	<a href="#">91</a>



<a href="#">7.238</a>	<a href="#">process</a>	<a href="#">91</a>
<a href="#">7.239</a>	<a href="#">commandLine</a>	<a href="#">91</a>
<a href="#">7.240</a>	<a href="#">ppid</a>	<a href="#">91</a>
<a href="#">7.241</a>	<a href="#">priority</a>	<a href="#">92</a>
<a href="#">7.242</a>	<a href="#">startTime</a>	<a href="#">92</a>
<a href="#">7.243</a>	<a href="#">routingtable</a>	<a href="#">92</a>
<a href="#">7.244</a>	<a href="#">destination</a>	<a href="#">92</a>
<a href="#">7.245</a>	<a href="#">gateway</a>	<a href="#">92</a>
<a href="#">7.246</a>	<a href="#">runlevelInfo</a>	<a href="#">93</a>
<a href="#">7.247</a>	<a href="#">runlevel</a>	<a href="#">93</a>
<a href="#">7.248</a>	<a href="#">start</a>	<a href="#">93</a>
<a href="#">7.249</a>	<a href="#">kill</a>	<a href="#">93</a>
<a href="#">7.250</a>	<a href="#">shadowItem</a>	<a href="#">93</a>
<a href="#">7.251</a>	<a href="#">chgLst</a>	<a href="#">94</a>
<a href="#">7.252</a>	<a href="#">chgAllow</a>	<a href="#">94</a>
<a href="#">7.253</a>	<a href="#">chgReq</a>	<a href="#">94</a>
<a href="#">7.254</a>	<a href="#">expWarn</a>	<a href="#">94</a>
<a href="#">7.255</a>	<a href="#">expInact</a>	<a href="#">94</a>
<a href="#">7.256</a>	<a href="#">expDate</a>	<a href="#">95</a>
<a href="#">7.257</a>	<a href="#">encryptMethod</a>	<a href="#">95</a>
<a href="#">7.258</a>	<a href="#">symlink</a>	<a href="#">95</a>
<a href="#">7.259</a>	<a href="#">symlinkFilepath</a>	<a href="#">95</a>
<a href="#">7.260</a>	<a href="#">canonicalPath</a>	<a href="#">96</a>
<a href="#">7.261</a>	<a href="#">sysctl</a>	<a href="#">96</a>
<a href="#">7.262</a>	<a href="#">kernelParameterName</a>	<a href="#">96</a>
<a href="#">7.263</a>	<a href="#">kernelParameterValue</a>	<a href="#">96</a>
<a href="#">7.264</a>	<a href="#">uname</a>	<a href="#">97</a>
<a href="#">7.265</a>	<a href="#">machineClass</a>	<a href="#">97</a>
<a href="#">7.266</a>	<a href="#">nodeName</a>	<a href="#">97</a>
<a href="#">7.267</a>	<a href="#">osName</a>	<a href="#">97</a>
<a href="#">7.268</a>	<a href="#">osRelease</a>	<a href="#">97</a>
<a href="#">7.269</a>	<a href="#">osVersion</a>	<a href="#">98</a>
<a href="#">7.270</a>	<a href="#">processorType</a>	<a href="#">98</a>
<a href="#">7.271</a>	<a href="#">internetService</a>	<a href="#">98</a>
<a href="#">7.272</a>	<a href="#">serviceProtocol</a>	<a href="#">98</a>
<a href="#">7.273</a>	<a href="#">serviceName</a>	<a href="#">98</a>
<a href="#">7.274</a>	<a href="#">flags</a>	<a href="#">99</a>
<a href="#">7.275</a>	<a href="#">noAccess</a>	<a href="#">99</a>
<a href="#">7.276</a>	<a href="#">onlyFrom</a>	<a href="#">99</a>
<a href="#">7.277</a>	<a href="#">port</a>	<a href="#">99</a>
<a href="#">7.278</a>	<a href="#">server</a>	<a href="#">99</a>
<a href="#">7.279</a>	<a href="#">serverArguments</a>	<a href="#">100</a>
<a href="#">7.280</a>	<a href="#">socketType</a>	<a href="#">100</a>
<a href="#">7.281</a>	<a href="#">registeredServiceType</a>	<a href="#">100</a>
<a href="#">7.282</a>	<a href="#">wait</a>	<a href="#">101</a>
<a href="#">7.283</a>	<a href="#">disabled</a>	<a href="#">101</a>
<a href="#">7.284</a>	<a href="#">windowsView</a>	<a href="#">101</a>
<a href="#">7.285</a>	<a href="#">fileauditedpermissions</a>	<a href="#">101</a>



<a href="#">7.286</a>	<a href="#">trusteeName</a>	<a href="#">102</a>
<a href="#">7.287</a>	<a href="#">auditStandardDelete</a>	<a href="#">102</a>
<a href="#">7.288</a>	<a href="#">auditStandardReadControl</a>	<a href="#">103</a>
<a href="#">7.289</a>	<a href="#">auditStandardWriteDac</a>	<a href="#">103</a>
<a href="#">7.290</a>	<a href="#">auditStandardWriteOwner</a>	<a href="#">104</a>
<a href="#">7.291</a>	<a href="#">auditStandardSynchronize</a>	<a href="#">104</a>
<a href="#">7.292</a>	<a href="#">auditAccessSystemSecurity</a>	<a href="#">105</a>
<a href="#">7.293</a>	<a href="#">auditGenericRead</a>	<a href="#">105</a>
<a href="#">7.294</a>	<a href="#">auditGenericWrite</a>	<a href="#">106</a>
<a href="#">7.295</a>	<a href="#">auditGenericExecute</a>	<a href="#">106</a>
<a href="#">7.296</a>	<a href="#">auditGenericAll</a>	<a href="#">107</a>
<a href="#">7.297</a>	<a href="#">auditFileReadData</a>	<a href="#">107</a>
<a href="#">7.298</a>	<a href="#">auditFileWriteData</a>	<a href="#">108</a>
<a href="#">7.299</a>	<a href="#">auditFileAppendData</a>	<a href="#">108</a>
<a href="#">7.300</a>	<a href="#">auditFileReadEa</a>	<a href="#">109</a>
<a href="#">7.301</a>	<a href="#">auditFileWriteEa</a>	<a href="#">109</a>
<a href="#">7.302</a>	<a href="#">auditFileExecute</a>	<a href="#">110</a>
<a href="#">7.303</a>	<a href="#">auditFileDeleteChild</a>	<a href="#">110</a>
<a href="#">7.304</a>	<a href="#">auditFileReadAttributes</a>	<a href="#">111</a>
<a href="#">7.305</a>	<a href="#">auditFileWriteAttributes</a>	<a href="#">111</a>
<a href="#">7.306</a>	<a href="#">fileeffectiverights</a>	<a href="#">112</a>
<a href="#">7.307</a>	<a href="#">standardDelete</a>	<a href="#">112</a>
<a href="#">7.308</a>	<a href="#">standardReadControl</a>	<a href="#">113</a>
<a href="#">7.309</a>	<a href="#">standardWriteDac</a>	<a href="#">113</a>
<a href="#">7.310</a>	<a href="#">standardWriteOwner</a>	<a href="#">113</a>
<a href="#">7.311</a>	<a href="#">standardSynchronize</a>	<a href="#">113</a>
<a href="#">7.312</a>	<a href="#">accessSystemSecurity</a>	<a href="#">113</a>
<a href="#">7.313</a>	<a href="#">genericRead</a>	<a href="#">114</a>
<a href="#">7.314</a>	<a href="#">genericWrite</a>	<a href="#">114</a>
<a href="#">7.315</a>	<a href="#">genericExecute</a>	<a href="#">114</a>
<a href="#">7.316</a>	<a href="#">genericAll</a>	<a href="#">114</a>
<a href="#">7.317</a>	<a href="#">fileReadData</a>	<a href="#">114</a>
<a href="#">7.318</a>	<a href="#">fileWriteData</a>	<a href="#">114</a>
<a href="#">7.319</a>	<a href="#">fileAppendData</a>	<a href="#">115</a>
<a href="#">7.320</a>	<a href="#">fileReadEa</a>	<a href="#">115</a>
<a href="#">7.321</a>	<a href="#">fileWriteEa</a>	<a href="#">115</a>
<a href="#">7.322</a>	<a href="#">fileExecute</a>	<a href="#">115</a>
<a href="#">7.323</a>	<a href="#">fileDeleteChild</a>	<a href="#">115</a>
<a href="#">7.324</a>	<a href="#">fileReadAttributes</a>	<a href="#">116</a>
<a href="#">7.325</a>	<a href="#">fileWriteAttributes</a>	<a href="#">116</a>
<a href="#">7.326</a>	<a href="#">groupInfo</a>	<a href="#">116</a>
<a href="#">7.327</a>	<a href="#">group</a>	<a href="#">116</a>
<a href="#">7.328</a>	<a href="#">user</a>	<a href="#">117</a>
<a href="#">7.329</a>	<a href="#">subgroup</a>	<a href="#">117</a>
<a href="#">7.330</a>	<a href="#">groupSidInfo</a>	<a href="#">117</a>
<a href="#">7.331</a>	<a href="#">userSidInfo</a>	<a href="#">117</a>
<a href="#">7.332</a>	<a href="#">userSid</a>	<a href="#">117</a>
<a href="#">7.333</a>	<a href="#">subgroupSid</a>	<a href="#">118</a>





<a href="#">7.334</a>	<a href="#">lockoutpolicy</a>	<a href="#">118</a>
<a href="#">7.335</a>	<a href="#">forceLogoff</a>	<a href="#">118</a>
<a href="#">7.336</a>	<a href="#">lockoutDuration</a>	<a href="#">118</a>
<a href="#">7.337</a>	<a href="#">lockoutObservationWindow</a>	<a href="#">119</a>
<a href="#">7.338</a>	<a href="#">lockoutThreshold</a>	<a href="#">119</a>
<a href="#">7.339</a>	<a href="#">passwordpolicy</a>	<a href="#">119</a>
<a href="#">7.340</a>	<a href="#">maxPasswdAge</a>	<a href="#">119</a>
<a href="#">7.341</a>	<a href="#">minPasswdAge</a>	<a href="#">120</a>
<a href="#">7.342</a>	<a href="#">minPasswdLen</a>	<a href="#">120</a>
<a href="#">7.343</a>	<a href="#">passwordHistLen</a>	<a href="#">120</a>
<a href="#">7.344</a>	<a href="#">passwordComplexity</a>	<a href="#">120</a>
<a href="#">7.345</a>	<a href="#">reversibleEncryption</a>	<a href="#">120</a>
<a href="#">7.346</a>	<a href="#">portInfo</a>	<a href="#">121</a>
<a href="#">7.347</a>	<a href="#">foreignPort</a>	<a href="#">121</a>
<a href="#">7.348</a>	<a href="#">printereffectiverights</a>	<a href="#">121</a>
<a href="#">7.349</a>	<a href="#">printerName</a>	<a href="#">122</a>
<a href="#">7.350</a>	<a href="#">printerAccessAdminister</a>	<a href="#">122</a>
<a href="#">7.351</a>	<a href="#">printerAccessUse</a>	<a href="#">122</a>
<a href="#">7.352</a>	<a href="#">jobAccessAdminister</a>	<a href="#">122</a>
<a href="#">7.353</a>	<a href="#">jobAccessRead</a>	<a href="#">122</a>
<a href="#">7.354</a>	<a href="#">registry</a>	<a href="#">122</a>
<a href="#">7.355</a>	<a href="#">hive</a>	<a href="#">123</a>
<a href="#">7.356</a>	<a href="#">registryKey</a>	<a href="#">123</a>
<a href="#">7.357</a>	<a href="#">registryKeyName</a>	<a href="#">124</a>
<a href="#">7.358</a>	<a href="#">lastWriteTime</a>	<a href="#">124</a>
<a href="#">7.359</a>	<a href="#">registryKeyType</a>	<a href="#">124</a>
<a href="#">7.360</a>	<a href="#">registryKeyValue</a>	<a href="#">125</a>
<a href="#">7.361</a>	<a href="#">regkeyauditedpermissions</a>	<a href="#">126</a>
<a href="#">7.362</a>	<a href="#">auditKeyQueryValue</a>	<a href="#">127</a>
<a href="#">7.363</a>	<a href="#">auditKeySetValue</a>	<a href="#">127</a>
<a href="#">7.364</a>	<a href="#">auditKeyCreateSubKey</a>	<a href="#">128</a>
<a href="#">7.365</a>	<a href="#">auditKeyEnumerateSubKeys</a>	<a href="#">128</a>
<a href="#">7.366</a>	<a href="#">auditKeyNotify</a>	<a href="#">129</a>
<a href="#">7.367</a>	<a href="#">auditKeyCreateLink</a>	<a href="#">129</a>
<a href="#">7.368</a>	<a href="#">auditKeyWow6464Key</a>	<a href="#">130</a>
<a href="#">7.369</a>	<a href="#">auditKeyWow6432Key</a>	<a href="#">130</a>
<a href="#">7.370</a>	<a href="#">auditKeyWow64Res</a>	<a href="#">131</a>
<a href="#">7.371</a>	<a href="#">regkeyeffectiverights</a>	<a href="#">131</a>
<a href="#">7.372</a>	<a href="#">keyQueryValue</a>	<a href="#">132</a>
<a href="#">7.373</a>	<a href="#">keySetValue</a>	<a href="#">132</a>
<a href="#">7.374</a>	<a href="#">keyCreateSubKey</a>	<a href="#">132</a>
<a href="#">7.375</a>	<a href="#">keyEnumerateSubKeys</a>	<a href="#">133</a>
<a href="#">7.376</a>	<a href="#">keyNotify</a>	<a href="#">133</a>
<a href="#">7.377</a>	<a href="#">keyCreateLink</a>	<a href="#">133</a>
<a href="#">7.378</a>	<a href="#">keyWow6464Key</a>	<a href="#">133</a>
<a href="#">7.379</a>	<a href="#">keyWow6432Key</a>	<a href="#">133</a>
<a href="#">7.380</a>	<a href="#">keyWow64Res</a>	<a href="#">133</a>
<a href="#">7.381</a>	<a href="#">service</a>	<a href="#">134</a>



- [7.382. displayName](#) . . . . . [134](#)
- [7.383. description](#) . . . . . [134](#)
- [7.384. serviceType](#) . . . . . [134](#)
- [7.385. startType](#) . . . . . [135](#)
- [7.386. currentState](#) . . . . . [136](#)
- [7.387. controlsAccepted](#) . . . . . [137](#)
- [7.388. startName](#) . . . . . [139](#)
- [7.389. serviceFlag](#) . . . . . [139](#)
- [7.390. dependencies](#) . . . . . [139](#)
- [7.391. serviceeffectiverights](#) . . . . . [139](#)
- [7.392. trusteeSid](#) . . . . . [140](#)
- [7.393. serviceQueryConf](#) . . . . . [140](#)
- [7.394. serviceChangeConf](#) . . . . . [140](#)
- [7.395. serviceQueryStat](#) . . . . . [140](#)
- [7.396. serviceEnumDependents](#) . . . . . [140](#)
- [7.397. serviceStart](#) . . . . . [141](#)
- [7.398. serviceStop](#) . . . . . [141](#)
- [7.399. servicePause](#) . . . . . [141](#)
- [7.400. serviceInterrogate](#) . . . . . [141](#)
- [7.401. serviceUserDefined](#) . . . . . [141](#)
- [7.402. sharedresourceauditedpermissions](#) . . . . . [142](#)
- [7.403. netname](#) . . . . . [142](#)
- [7.404. sharedresourceeffectiverights](#) . . . . . [142](#)
- [7.405. user](#) . . . . . [143](#)
- [7.406. enabled](#) . . . . . [143](#)
- [7.407. lastLogon](#) . . . . . [143](#)
- [7.408. groupSid](#) . . . . . [143](#)
- [8. Acknowledgements](#) . . . . . [143](#)
- [9. IANA Considerations](#) . . . . . [144](#)
- [10. Security Considerations](#) . . . . . [144](#)
- [11. Operational Considerations](#) . . . . . [145](#)
  - [11.1. Endpoint Designation](#) . . . . . [145](#)
  - [11.2. Timestamp Accuracy](#) . . . . . [146](#)
- [12. Privacy Considerations](#) . . . . . [147](#)
- [13. References](#) . . . . . [147](#)
  - [13.1. Normative References](#) . . . . . [147](#)
  - [13.2. Informative References](#) . . . . . [148](#)
- [Appendix A. Change Log](#) . . . . . [149](#)
  - [A.1. Changes in Revision 01](#) . . . . . [149](#)
  - [A.2. Changes in Revision 02](#) . . . . . [150](#)
  - [A.3. Changes in Revision 03](#) . . . . . [150](#)
  - [A.4. Changes in Revision 04](#) . . . . . [151](#)
  - [A.5. Changes in Revision 05](#) . . . . . [151](#)
  - [A.6. Changes in Revision 06](#) . . . . . [151](#)
  - [A.7. Changes in Revision 07](#) . . . . . [152](#)
- [Authors' Addresses](#) . . . . . [152](#)



## **1. Introduction**

The SACM Information Model (IM) serves multiple purposes:

- o to ensure interoperability between SACM data models that are used as transport encodings,
- o to provide a standardized set of Information Elements - the SACM Vocabulary - to enable the exchange of content vital to automated security posture assessment, and
- o to enable secure information sharing in a scalable and extensible fashion in order to support the tasks conducted by SACM components.

A complete set of requirements imposed on the IM can be found in [[I-D.ietf-sacm-requirements](#)]. The SACM IM is intended to be used for standardized data exchange between SACM components (data in motion). Nevertheless, the Information Elements (IE) and their relationships defined in this document can be leveraged to create and align corresponding data models for data at rest.

The information model expresses, for example, target endpoint (TE) attributes, guidance, and evaluation results. The corresponding Information Elements are consumed and produced by SACM components as they carry out tasks.

The primary tasks that this information model supports (on data, control, and management plane) are:

- o TE Discovery
- o TE Characterization
- o TE Classification
- o Collection
- o Evaluation
- o Information Sharing
- o SACM Component Discovery
- o SACM Component Authentication
- o SACM Component Authorization



- o SACM Component Registration

These tasks are defined in [[I-D.ietf-sacm-terminology](#)].

## **[2.](#) Conventions used in this document**

### **[2.1.](#) Requirements Language**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

### **[2.2.](#) Information Element Examples**

The notation used to define the SACM Information Elements (IEs) is based on a customized version of the IPFIX information model syntax [[RFC7012](#)] which is described in Figure 2. However, there are several examples presented throughout the document that use a simplified pseudo-code to illustrate the basic structure. It should be noted that while they include actual names of subjects and attributes as well as values, they are not intended to influence how corresponding SACM IEs should be defined in [Section 7](#). The examples are provided for demonstration purposes only.

## **[3.](#) Information Elements**

The IEs defined in this document comprise the building blocks by which all SACM content is composed. They are consumed and provided by SACM components on the data plane. Every Information Element has a unique label: its name. Every type of IE defined by the SACM IM is registered as a type at the IANA registry. The Integer Index of the IANA SMI number tables can be used by SACM data models.

### **[3.1.](#) Context of Information Elements**

The IEs in this information model represent information related to assets in the following areas (based on the use cases described in [[RFC7632](#)]):

- o Endpoint Management
- o Software Inventory Management
- o Hardware Inventory Management
- o Configuration Management
- o Vulnerability Management





### **3.2. Extensibility of Information Elements**

A SACM data model based on this information model MAY include additional information elements that are not defined here. The labels of additional Information Elements included in different SACM data models MUST NOT conflict with the labels of the Information Elements defined by this information model, and the names of additional Information Elements MUST NOT conflict with each other or across multiple data models. In order to avoid naming conflicts, the labels of additional IEs SHOULD be prefixed to avoid collisions across extensions. The prefix MUST include an organizational identifier and therefore, for example, MAY be an IANA enterprise number, a (partial) name space URI, or an organization name abbreviation.

### **4. Structure of Information Elements**

There are two basic types of IEs:

- o Attributes: an instance of an attribute type is the simplest IE structure comprised of a unique attribute name and an attribute value.
- o Subjects: a subject is a richer structure that has a unique subject name and one or more attributes or subjects. In essence, instances of a subject type are defined (and differentiated) by the attribute values and subjects associated with it.

```
hostname = "arbutus"  
  
coordinates = (  
  latitude = N27.99619,  
  longitude = E86.92761  
)
```

Figure 1: Example instance of an attribute and subject.

In general, every piece of information that enables security posture assessment or further enriches the quality of the assessment process can be associated with metadata. In the SACM IM, metadata is represented by specific subjects and is bundled with other attributes or subjects to provide additional information about them. The IM explicitly defines two kinds of metadata:

- o Metadata focusing on the data origin (the SACM component that provides the information to the SACM domain)



- o Metadata focusing on the data source (the target endpoint that is assessed)

Metadata can also include relationships that refer to other associated IEs (or SACM content in general) by using referencing labels that have to be included in the metadata of the associated IE.

Subjects can be nested and the SACM IM allows for circular or recursive nesting. The association of IEs via nesting results in a tree-like structure wherein subjects compose the root and intermediary nodes and attributes the leaves of the tree. This semantic structure does not impose a specific structure on SACM data models regarding data in motion or data repository schemata for data at rest.

The SACM IM provides two conceptual top-level subjects that are used to ensure a homogeneous structure for SACM content and its associated metadata: SACM statements and SACM content-elements. Every set of IEs that is provided by a SACM component must provide the information contained in these two subjects although it is up to the implementer whether or not the subjects are explicitly defined in a data model.

The notation the SACM IM is defined in is based on a modified version of the IP Information Flow Export (IPFIX) Information Model syntax described in [Section 2.1 of \[RFC7012\]](#). The customized syntax used by the SACM IM is defined below in Figure 2.

elementId (required): The numeric identifier of the Information Element. It is used for the compact identification of an Information Element. If this identifier is used without an enterpriseID, then the elementId must be unique, and the description of allowed values is administrated by IANA. The value "TBD" may be used during development of the information model until an elementId is assigned by IANA and filled in at publication time.

enterpriseId (optional): Enterprises may wish to define Information Elements without registering them with IANA, for example, for enterprise-internal purposes. For such Information Elements, the elementId is



not sufficient when used outside the enterprise. If specifications of enterprise-specific Information Elements are made public and/or if enterprise-specific identifiers are used by SACM components outside the enterprise, then the enterprise-specific identifier MUST be made globally unique by combining it with an enterprise identifier. Valid values for the enterpriseId are defined by IANA as Structure of Management Information (SMI) network management private enterprise numbers.

- name (required): A unique and meaningful name for the Information Element.
- dataType (required): There are two kinds of datatypes: simple and structured. Attributes are defined using simple datatypes and subjects are defined using structured datatypes. The contents of the datatype field will be either a reference to one of the simple datatypes listed in [Section 5.1](#), or the specification of structured datatype as defined in [Section 5.2](#).
- status (required): The status of the specification of the Information Element. Allowed values are "current" and "deprecated". All newly defined Information Elements have "current" status. The process for moving Information Elements to the "deprecated" status is TBD.
- description (required): Describes the meaning of the Information Element, how it is derived, conditions for its use, etc.
- structure (optional): A parsable property that provides details about the definition of



structured Information Elements as described in [Section 5.2](#).

references (optional): Identifies other RFCs or documents outside the IETF which provide additional information or context about the Information Element.

Figure 2: Information Element Specification Template

#### **[4.1.](#) Information Element Naming Convention**

SACM Information Elements must adhere to the following naming conventions.

- o Names SHOULD be descriptive
- o Names MUST be unique within the SACM registry. Enterprise-specific names SHOULD be prefixed with a Private Enterprise Number [[PEN](#)].
- o Names MUST start with lowercase letters unless it begins with a Private Enterprise Number
- o Composed names MUST use capital letters for the first letter of each part

#### **[4.2.](#) SACM Content Elements**

Every piece of information that is provided by a SACM component is always associated with a set of metadata, for example, the timestamp at which this set of information was produced (e.g. by a collection task) or what target endpoint this set of information is about (e.g. the data-source or a target endpoint identifier, respectively). The subject that associates content IE with content-metadata IE is called a content-element. Content metadata can also include relationships that express associations with other content-elements.





```
content-element = (  
  content-metadata = (  
    collection-timestamp = 146193322,  
    data-source = fb02e551-7101-4e68-8dec-1fde6bd10981  
  ),  
  hostname = "arbutus",  
  coordinates = (  
    latitude = N27.99619,  
    longitude = E86.92761  
  )  
)
```

Figure 3: Example set of IEs associated with a timestamp and a target endpoint label.

### **4.3. SACM Statements**

One or more SACM content elements are bundled in a SACM statement. In contrast to content-metadata, statement-metadata focuses on the providing SACM component instead of the target endpoint that the content is about. The only content-specific metadata included in the SACM statement is the content-type IE. Therefore, multiple content-elements that share the same statement metadata and are of the same content-type can be included in a single SACM statement. A SACM statement functions similar to an envelope or a header. Its purpose is to enable the tracking of the origin of data inside a SACM domain and more importantly to enable the mitigation of conflicting information that may originate from different SACM components. How a consuming SACM component actually deals with conflicting information is out-of-scope of the SACM IM. Semantically, the term statement implies that the SACM content provided by a SACM component might not be correct in every context, but rather is the result of a best-effort to produce correct information.



```
sacm-statement = (  
  statement-metadata = (  
    publish-timestamp = 1461934031,  
    data-origin = 24e67957-3d31-4878-8892-da2b35e121c2,  
    content-type = observation  
  ),  
  content-element = (  
    content-metadata = (  
      collection-timestamp = 146193322,  
      data-source = fb02e551-7101-4e68-8dec-1fde6bd10981  
    ),  
    hostname = "arbutus"  
  )  
)
```

Figure 4: Example of a simple SACM statement including a single content-element.



```

sacm-statement = (
  statement-metadata = (
    publish-timestamp = 1461934031,
    data-origin = 24e67957-3d31-4878-8892-da2b35e121c2
    content-type = observation
  ),
  content-element = (
    content-metadata = (
      collection-timestamp = 146193322,
      data-source = fb02e551-7101-4e68-8dec-1fde6bd10981
    ),
    coordinates = (
      latitude = N27.99619,
      longitude = E86.92761
    )
  )
)

sacm-statement = (
  statement-metadata = (
    publish-timestamp = 1461934744,
    data-origin = e42885a1-0270-44e9-bb5c-865cf6bd4800,
    content-type = observation
  ),
  content-element = (
    content-metadata = (
      collection-timestamp = 146193821,
      te-label = fb02e551-7101-4e68-8dec-1fde6bd10981
    ),
    coordinates = (
      latitude = N16.67622,
      longitude = E141.55321
    )
  )
)

```

Figure 5: Example of conflicting information originating from different SACM components.

#### 4.4. Relationships

An IE can be associated with another IE, e.g. a user-name attribute can be associated with a content-authorization subject. These references are expressed via the relationships subject, which can be included in a corresponding content-metadata subject. The relationships subject includes a list of one or more references. The SACM IM does not enforce a SACM domain to use unique identifiers as



references. Therefore, there are at least two ways to reference another

- o The value of a reference represents a specific content-label that is unique in a SACM domain (and has to be included in the corresponding content-element metadata in order to be referenced), or
- o The reference is a subject that includes an appropriate number of IEs in order to identify the referenced content-element by its actual content.

It is recommended to provide unique identifiers in a SACM domain and the SACM IM provides a corresponding naming-convention as a reference in [Section 4.1](#). The alternative highlighted above summarizes a valid approach that does not require unique identifiers and is similar to the approach of referencing target endpoints via identifying attributes included in a characterization record.

```
content-element = (  
  content-metadata = (  
    collection-timestamp = 1461934031,  
    te-label =  
    fb02e551-7101-4e68-8dec-1fde6bd10981  
    relationships = (  
      associated-with-user-account =  
      f3d70ef4-7e18-42af-a894-8955ba87c95d  
    )  
  ),  
  hostname = "arbutus"  
)  
  
content-element = (  
  content-metadata = (  
    content-label = f3d70ef4-7e18-42af-a894-8955ba87c95d  
  ),  
  user-account = (  
    username = romeo  
    authentication = local  
  )  
)
```

Figure 6: Example instance of a content-element subject associated with another subject via its content metadata.





#### 4.5. Event

Event subjects provide a structure to represent the change of IE values that was detected by a collection task at a specific point of time. It is mandatory to include the new values and the collection timestamp in an event subject and it is recommended to include the past values and a collection timestamp that were replaced by the new IE values. Every event can also be associated with a subject-specific event-timestamp and a lastseen-timestamp that might differ from the corresponding collection-timestamps. If these are omitted the collection-timestamp that is included in the content-metadata subject is used instead.

```
sacm-statement = (  
  statement-metadata = (  
    publish-timestamp = 1461934031,  
    data-origin = 24e67957-3d31-4878-8892-da2b35e121c2,  
    content-type = event  
  ),  
  event = (  
    event-attributes = (  
      event-name = "host-name change",  
      content-element = (  
        content-metadata = (  
          collection-timestamp = 146193322,  
          data-source =  
            fb02e551-7101-4e68-8dec-1fde6bd10981,  
          event-component = past-state  
        ),  
        hostname = "arbutus"  
      ),  
      content-element = (  
        content-metadata = (  
          collection-timestamp = 146195723,  
          data-source =  
            fb02e551-7101-4e68-8dec-1fde6bd10981,  
          event-component = current-state  
        ),  
        hostname = "lilac"  
      )  
    )  
  )  
)
```

Figure 7: Example of a SACM statement containing an event.



## **[4.6.](#) Categories**

Categories are special IEs that enable to refer to multiple types of IE via just one name. Therefore, they are similar to a type-choice. A prominent example of a category is network-address. Network-address is a category that every kind of network address is associated with, e.g. mac-address, ipv4-address, ipv6-address, or typed-network-address. If a subject includes network-address as one of its components, any of the category members are valid to be used in its place.

Another prominent example is EndpointIdentifier. Some IEs can be used to identify (and over time re-recognize) target endpoints - those are associated with the category endpoint-identifier.

## **[5.](#) Abstract Data Types**

This section describes the set of valid abstract data types that can be used for the specification of the SACM Information Elements in [Section 7](#). SACM currently supports two classes of datatypes that can be used to define Information Elements.

- o Simple: Datatypes that are atomic and are used to define the type of data represented by an attribute Information Element.
- o Structured: Datatypes that can be used to define the type of data represented by a subject Information Element.

Note that further abstract data types may be specified by future extensions of the SACM information model.

### **[5.1.](#) Simple Datatypes**

#### **[5.1.1.](#) IPFIX Datatypes**

To facilitate the use of existing work, SACM supports the following abstract data types defined in [Section 3 of \[RFC7012\]](#).

- o unsigned8, unsigned16, unsigned32, unsigned64
- o signed8, signed16, signed32, signed64
- o float32, float64
- o boolean
- o macAddress



- o octetArray
- o string
- o dateTimeSeconds, dateTimeMilliseconds, dateTimeMicroseconds, dateTimeNanoSeconds
- o ipv4Address, ipv6Address

## 5.2. Structured Datatypes

### 5.2.1. List Datatypes

SACM defines the following abstract list data types that are used to represent the structured data associated with subjects.

- o list: indicates that the Information Element order is not significant but MAY be preserved.
- o orderedList: indicates that Information Element order is significant and MUST be preserved.

The notation for defining a SACM structured datatype is based on regular expressions, which are composed of the keywords "list" or "orderedList" and an Information Element expression. IE expressions use some of the regular expression syntax and operators, but the terms in the expression are the names of defined Information Elements instead of character classes. The syntax for defining list and orderedList datatypes is described below, using BNF:

```

<list-def> -> ("list"|"orderedList") "(" <ie-expression> ")"
<ie-expression> -> <ie-name> <cardinality>?
                  ( ("," | "|") <ie-name> <cardinality>?)*
<cardinality> -> "*" | "+" | "?" |
                  ( "(" <non-neg-int> ("," <non-neg-int>)? ")" )

```

Figure 8: Syntax for Defining List Datatypes

As seen above, multiple occurrences of an Information Element may be present in a structured datatype. The cardinality of an Information Element within a structured Information Element definition is defined by the following operators:



- \* - zero or more occurrences
- + - one or more occurrences
- ? - zero or one occurrence
- (m,n) - between m and n occurrences

Figure 9: Specifying Cardinality for Structured Datatypes

The absence of a cardinality operator implies one mandatory occurrence of the Information Element.

Below is an example of a structured Information Element definition.

```
personInfo = list(firstName, middleNames?, lastName)
firstName = string
middleNames = orderedList(middleName+)
middleName = string
lastName = string
```

As an example, consider the name "John Ronald Reuel Tolkien". Below are instances of this name, structured according to the personInfo definition.

```
personInfo = (firstName="John", middleNames(middleName="Ronald",
middleName="Reuel"), lastName="Tolkien")

personInfo = (middleNames(middleName="Ronald", middleName=" Reuel"),
lastName="Tolkien", firstName="John")
```

The instance below is not legal with respect to the definition of personInfo because the order in middleNames is not preserved.

```
personInfo = (firstName="John", middleNames(middleName=" Reuel",
middleName="Ronald"), lastName="Tolkien")
```

Figure 10: Example of Defining a Structured List Datatype

### **5.2.2. Enumeration Datatype**

SACM defines the following abstract enumeration datatype that is used to represent the restriction of an attribute value to a set of values.





```

name, hex-value, description
<enumeration-def> -> -> <name> ";" <hex-value> ";" <description>
<name> -> [0-9a-zA-Z]+
<hex-value> -> 0x[0-9a-fA-F]+
<description> -> [0-9a-zA-Z\.\,]+

```

Figure 11: Syntax for Defining an Enumeration Datatype

Below is an example of a structured Information Element definition for an enumeration.

```

Red      ; 0x1 ; The color is red.
Orange  ; 0x2 ; The color is orange.
Yellow  ; 0x3 ; The color is yellow.
Green   ; 0x4 ; The color is green.
...

```

Figure 12: Example of Defining a Structured Enumeration Datatype

## 6. Information Model Assets

In order to represent the Information Elements related to the areas listed in [Section 3.1](#), the information model defines the information needs (or metadata about those information needs) related to following types of assets which are defined in [\[I-D.ietf-sacm-terminology\]](#) (and included below for convenience) which are of interest to SACM. Specifically:

- o Endpoint
- o Software Component
- o Hardware Component
- o Identity
- o Guidance
- o Evaluation Results

The following figure shows the make up of an Endpoint asset which contains zero or more hardware components and zero or more software components each of which may have zero or more instances running an endpoint at any given time as well as zero or more identities that act on behalf of the endpoint when interfacing with other endpoints, tools, or services. An endpoint may also contain other endpoints in the case of a virtualized environment.



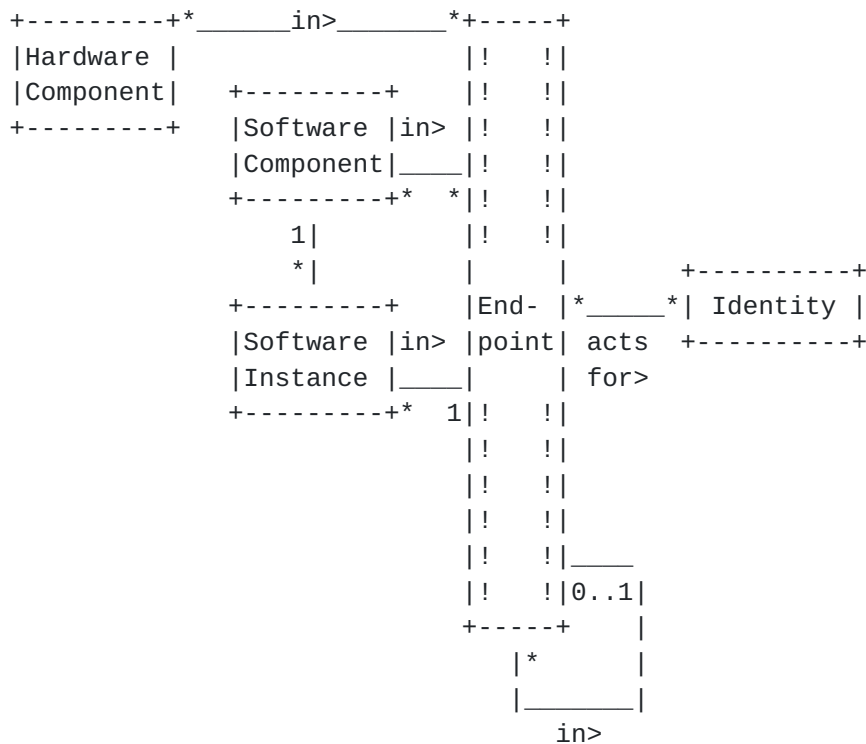


Figure 13: Model of an Endpoint

**6.1. Asset**

As defined in [RFC4949], an asset is a system resource that is (a) required to be protected by an information system's security policy, (b) intended to be protected by a countermeasure, or (c) required for a system's mission.

In the scope of SACM, an asset can be composed of other assets. Examples of Assets include: Endpoints, Software, Guidance, or Identity. Furthermore, an asset is not necessarily owned by an organization.

**6.2. Endpoint**

From [RFC5209], an endpoint is any computing device that can be connected to a network. Such devices normally are associated with a particular link layer address before joining the network and potentially an IP address once on the network. This includes: laptops, desktops, servers, cell phones, or any device that may have an IP address.

To further clarify, an endpoint is any physical or virtual device that may have a network address. Note that, network infrastructure



devices (e.g. switches, routers, firewalls), which fit the definition, are also considered to be endpoints within this document.

Physical endpoints are always composites that are composed of hardware components and software components. Virtual endpoints are composed entirely of software components and rely on software components that provide functions equivalent to hardware components.

The SACM architecture differentiates two essential categories of endpoints: Endpoints whose security posture is intended to be assessed (target endpoints) and endpoints that are specifically excluded from endpoint posture assessment (excluded endpoints).

### **6.3. Hardware Component**

Hardware components are the distinguishable physical components that compose an endpoint. The composition of an endpoint can be changed over time by adding or removing hardware components. In essence, every physical endpoint is potentially a composite of multiple hardware components, typically resulting in a hierarchical composition of hardware components. The composition of hardware components is based on interconnects provided by specific hardware types (e.g. mainboard is a hardware type that provides local busses as an interconnect). In general, a hardware component can be distinguished by its serial number.

Examples of a hardware components include: motherboards, network interfaces, graphics cards, hard drives, etc.

### **6.4. Software Component**

A software package installed on an endpoint (including the operating system) as well as a unique serial number if present (e.g. a text editor associated with a unique license key).

It should be noted that this includes both benign and harmful software packages. Examples of benign software components include: applications, patches, operating system kernel, boot loader, firmware, code embedded on a webpage, etc. Examples of malicious software components include: malware, trojans, viruses, etc.

#### **6.4.1. Software Instance**

A running instance of the software component (e.g. on a multi-user system, one logged-in user has one instance of a text editor running and another logged-in user has another instance of the same text editor running, or on a single-user system, a user could have multiple independent instances of the same text editor running).



## **6.5. Identity**

Any mechanism that can be used to identify an asset during an authentication process. Examples include usernames, user and device certificates, etc. Note, that this is different than the identity of assets in the context of designation as described in [Section 11.1](#).

## **6.6. Guidance**

Guidance is input instructions to processes and tasks, such as collection or evaluation. Guidance influences the behavior of a SACM component and is considered content of the management plane. Guidance can be manually or automatically generated or provided. Typically, the tasks that provide guidance to SACM components have a low-frequency and tend to be sporadic. A prominent example of guidance are target endpoint profiles, but guidance can have many forms, including:

Configuration, e.g. a SACM component's name, or a CMDB's IPv6 address.

Profiles, e.g. a set of expected states for network behavior associated with target endpoints employed by specific users.

Policies, e.g. an interval to refresh the registration of a SACM component, or a list of required capabilities for SACM components in a specific location.

### **6.6.1. Collection Guidance**

A collector may need guidance to govern what it collects and when. Collection Guidance provides instructions for a Collector that specifies which endpoint attributes to collect, when to collect them, and how to collect them. Collection Guidance is composed of Target Endpoint Attribute Guidance, Frequency Guidance, and Method Guidance.

- o Target Endpoint Attribute Guidance: Set of endpoint attributes that are supposed to be collected from a target endpoint. The definition of the set of endpoint attributes is typically based on an endpoint characterization record.
- o Frequency Guidance: Specifies when endpoint attributes are to be collected.
- o Method Guidance: Indicates how endpoint attributes are to be collected.





### **6.6.2. Evaluation Guidance**

An evaluator typically needs guidance to govern what it considers to be a good or bad security posture. Evaluation Guidance provides instructions for an Evaluator that specifies which endpoint attributes to evaluate, the desired state of those endpoint attributes, and any special requirements that enable an Evaluator to determine if the endpoint attributes can be used in the evaluation (e.g. freshness of data, how it was collected, etc.). Evaluation Guidance is composed of Target Endpoint Attribute Guidance, Expected Endpoint Attribute Value Guidance, and Frequency Guidance.

- o Target Endpoint Attribute Guidance: Set of target endpoint attributes that are supposed to be used in an evaluation as well as any requirements on the endpoint attributes. The definition of the set of endpoint attributes is typically based on an endpoint characterization record.
- o Expected Endpoint Attribute Value Guidance: The expected values of the endpoint attributes described in the Target Endpoint Attribute Guidance.
- o Frequency Guidance: Specifies when endpoint attributes are to be evaluated.
- o Method Guidance: Indicates how endpoint attributes are to be collected.

### **6.6.3. Classification Guidance**

A SACM Component carrying out the Target Endpoint Classification Task may need guidance on how to classify an endpoint. Specifically, how to associate endpoint classes with a specific target endpoint characterization record. Target Endpoint Classes function as guidance for collection, evaluation, remediation and security posture assessment in general. Classification Guidance is composed of Target Endpoint Attribute Guidance and Class Guidance.

- o Target Endpoint Attribute Guidance: Set of target endpoint attributes that are supposed to be used to identify the endpoint characterization record.
- o Class Guidance: A list of target endpoint classes that are to be associated with the identified target endpoint characterization record.



#### **6.6.4. Storage Guidance**

An SACM Component typically needs guidance to govern what information it should store and where. Storage Guidance provides instructions for a SACM Component that specifies which security automation information should be stored, for how long, and on which endpoint. Storage Guidance is composed of Target Endpoint Attribute Guidance, Expected Security Automation Information Guidance, and Retention Guidance.

- o Target Endpoint Attribute Guidance: Set of target endpoint attributes that are supposed to be used to identify the endpoint where the security automation information is to be stored.
- o Expected Security Automation Information Guidance: The security automation information that is expected to be stored (guidance, collected posture attributes, results, etc.).
- o Retention Guidance: Specifies how long the security automation information should be stored.

#### **6.6.5. Evaluation Results**

Evaluation Results are the output of comparing the actual state of an endpoint against the expected state of an endpoint. In addition to the actual results of the comparison, Evaluation Results should include the Evaluation Guidance and actual target endpoint attributes values used to perform the evaluation.

### **7. Information Model Elements**

This section defines the specific Information Elements and relationships that will be implemented by data models and transported between SACM Components.

#### **7.1. accessPrivilegeType**

```
elementId: TBD
name: accessPrivilegeType
dataType: string
status: current
description: A set of types that represent access
privileges (read, write, none, etc.).
```



### [7.2.](#) **accountName**

elementId: TBD  
name: accountName  
dataType: string  
status: current  
description: A label that uniquely identifies an account that can require some form of (user) authentication to access.

### [7.3.](#) **administrativeDomainType**

elementId: TBD  
name: accessPrivilegeType  
dataType: string  
status: current  
description: A label the is supposed to uniquely identify an administrative domain.

### [7.4.](#) **addressAssociationType**

elementId: TBD  
name: accessPrivilegeType  
dataType: string  
status: current  
description: A label the is supposed to uniquely identify an administrative domain.

### [7.5.](#) **addressMaskValue**

elementId: TBD  
name: addressMaskValue  
dataType: string  
status: current  
description: A value that expresses a generic address subnetting bitmask.

### [7.6.](#) **addressType**

elementId: TBD  
name: addressType  
dataType: string  
status: current  
description: A set of types that specifies the type of address that is expressed in an address subject (e.g. ethernet, modbus, zigbee).



### [7.7.](#) **addressValue**

elementId: TBD  
name: addressValue  
dataType: string  
status: current  
description: A value that expresses a generic network address.

### [7.8.](#) **applicationComponent**

elementId: TBD  
name: applicationComponent  
dataType: string  
status: current  
description: A label that references a "sub"-application that is part of the application (e.g. an add-on, a cipher-suite, a library).

### [7.9.](#) **applicationLabel**

elementId: TBD  
name: applicationLabel  
dataType: string  
status: current  
description: A label that is supposed to uniquely reference an application.

### [7.10.](#) **applicationType**

elementId: TBD  
name: applicationType  
dataType: string  
status: current  
description: A set of types (FIXME maybe a finite set is not realistic here - value not enumerator?) that identifies the type of (user-space) application (e.g. text-editor, policy-editor, service-client, service-server, calender, rouge-like RPG).

### [7.11.](#) **applicationManufacturer**

elementId: TBD  
name: applicationManufacturer  
dataType: string  
status: current  
description: The name of the vendor that created the application.





### [7.12.](#) authenticator

elementId: TBD  
name: authenticator  
dataType: string  
status: current  
description: A label that references a SACM component that can authenticate target endpoints (can be used in a target-endpoint subject to express that the target endpoint was authenticated by that SACM component).

### [7.13.](#) authenticationType

elementId: TBD  
name: authenticationType  
dataType: string  
status: current  
description: A set of types that expresses which type of authentication was used to enable a network interaction/connection.

### [7.14.](#) birthdate

elementId: TBD  
name: birthdate  
dataType: string  
status: current  
description: A label for the registered day of birth of a natural person (e.g. the date of birth of a person as an ISO date string).  
references: <http://rs.tdwg.org/ontology/voc/Person#birthdate>

### [7.15.](#) bytesReceived

elementId: TBD  
name: bytesReceived  
dataType: string  
status: current  
description: A value that represents a number of octets received on a network interface.

### [7.16.](#) bytesSent



elementId: TBD  
name: bytesSent  
dataType: string  
status: current  
description: A value that represents the number of octets received on a network interface.

#### [7.17.](#) bytesSent

elementId: TBD  
name: bytesSent  
dataType: string  
status: current  
description: A value that represents the number of octets sent on a network interface.

#### [7.18.](#) certificate

elementId: TBD  
name: certificate  
dataType: string  
status: current  
description: A value that expresses a certificate that can be collected from a target endpoint.

#### [7.19.](#) collectionTaskType

elementId: TBD  
name: collectionTaskType  
dataType: string  
status: current  
description: A set of types that defines how collected SACM content was acquired (e.g. network-observation, remote-acquisition, self-reported).

#### [7.20.](#) confidence

elementId: TBD  
name: confidence  
dataType: string  
status: current  
description: A representation of the subjective probability that the assessed value is correct. If no confidence value is given, it is assumed that the confidence is 1. Acceptable values are between 0 and 1.



### [7.21.](#) **contentAction**

elementId: TBD  
name: contentAction  
dataType: string  
status: current  
description: A set of types that express a type of action (e.g. add, delete, update). It can be associated, for instance, with an event subject or with a network observation.

### [7.22.](#) **countryCode**

elementId: TBD  
name: countryCode  
dataType: string  
status: current  
description: A set of types according to ISO 3166-1.

### [7.23.](#) **dataOrigin**

elementId: TBD  
name: dataOrigin  
dataType: string  
status: current  
description: A label that uniquely identifies a SACM component in and across SACM domains.

### [7.24.](#) **dataSource**

elementId: TBD  
name: dataSource  
dataType: string  
status: current  
description: A label that is supposed to uniquely identify the data source (e.g. a target endpoint or sensor) that provided an initial endpoint attribute record.

### [7.25.](#) **default-depth**

elementId: TBD  
name: default-depth  
dataType: string  
status: current  
description: A value that expresses how often a circular reference of subject is allowed to repeat, or how deep a recursive nesting may occur, respectively.



**[7.26.](#) discoverer**

elementId: TBD  
name: contentAction  
dataType: string  
status: current  
description: A label that refers to the SACM component that discovered a target endpoint (can be used in a target-endpoint subject to express, for example, that the target endpoint was authenticated by that SACM component).

**[7.27.](#) emailAddress**

elementId: TBD  
name: countryCode  
dataType: string  
status: current  
description: A value that expresses an email-address.

**[7.28.](#) eventType**

elementId: TBD  
name: eventType  
dataType: string  
status: current  
description: a set of types that define the categories of an event (e.g. access-level-change, change-of-priviledge, change-of-authorization, environmental-event, or provisioning-event).

**[7.29.](#) eventThreshold**

elementId: TBD  
name: eventThreshold  
dataType: string  
status: current  
description: if applicable, a value that can be included in an event subject to indicate what numeric threshold value was crossed to trigger that event.

**[7.30.](#) eventThresholdName**





elementId: TBD  
name: eventThresholdName  
dataType: string  
status: current  
description: If an event is created due to a crossed threshold, the threshold might have a name associated with it that can be expressed via this value.

#### [7.31.](#) eventTrigger

elementId: TBD  
name: eventTrigger  
dataType: string  
status: current  
description: This value is used to express more complex trigger conditions that may cause the creation of an event.

#### [7.32.](#) eventTrigger

elementId: TBD  
name: eventTrigger  
dataType: string  
status: current  
description: This value is used to express more complex trigger conditions that may cause the creation of an event.

#### [7.33.](#) firmwareId

elementId: TBD  
name: firmwareId  
dataType: string  
status: current  
description: A label that represents the BIOS or firmware ID of a specific target endpoint.

#### [7.34.](#) hostName

elementId: TBD  
name: hostName  
dataType: string  
status: current  
description: A label typically associated with an endpoint, but, not always intended to be unique given scope.



**7.35. interfaceLabel**

elementId: TBD  
name: interfaceLabel  
dataType: string  
status: current  
description: A unique label that can be used to  
reference a network interface.

**7.36. ipv6AddressSubnetMask**

elementId: TBD  
name: ipv6AddressSubnetMask  
dataType: string  
status: current  
description: An IPv6 subnet bitmask.

**7.37. ipv6AddressSubnetMaskCidrNotation**

elementId: TBD  
name: ipv6AddressSubnetMaskCidrNotation  
dataType: string  
status: current  
description: An IPv6 subnet bitmask in CIDR notation.

**7.38. ipv6AddressValue**

elementId: TBD  
name: ipv6AddressValue  
dataType: ipv6Address  
status: current  
description: An IPv6 subnet bitmask in CIDR notation.  
a network interface.

**7.39. ipv4AddressSubnetMask**

elementId: TBD  
name: ipv4AddressSubnetMask  
dataType: string  
status: current  
description: An IPv4 subnet bitmask.

**7.40. ipv4AddressSubnetMaskCidrNotation**



elementId: TBD  
name: ipv4AddressSubnetMaskCidrNotation  
dataType: string  
status: current  
description: An IPv4 subnet bitmask in CIDR notation.

#### [7.41.](#) **ipv4AddressValue**

elementId: TBD  
name: ipv4AddressValue  
dataType: ipv4Address  
status: current  
description: An IPv4 address value.

#### [7.42.](#) **layer2InterfaceType**

elementId: TBD  
name: layer2InterfaceType  
dataType: string  
status: current  
description: A set of types referenced by IANA ifType.

#### [7.43.](#) **layer4PortAddress**

elementId: TBD  
name: layer4PortAddress  
dataType: unsigned32  
status: current  
description: A layer 4 port address typically associated with TCP and UDP protocols.

#### [7.44.](#) **layer4Protocol**

elementId: TBD  
name: layer4Protocol  
dataType: string  
status: current  
description: A set of types that express a layer 4 protocol (e.g. UDP or TCP).

#### [7.45.](#) **locationName**



elementId: TBD  
name: locationName  
dataType: string  
status: current  
description: A value that represents a named region of physical space.

#### [7.46.](#) **macAddressValue**

elementId: TBD  
name: macAddressValue  
dataType: string  
status: current  
description: A value that expresses an Ethernet address.

#### [7.47.](#) **methodLabel**

elementId: TBD  
name: methodLabel  
dataType: string  
status: current  
description: A label that references a specific method registered and used in a SACM domain (e.g. method to match and re-identify target endpoints via identifying attributes).

#### [7.48.](#) **methodRepository**

elementId: TBD  
name: methodRepository  
dataType: string  
status: current  
description: A label that references a SACM component methods can be registered at and that can provide guidance in the form of registered methods to other SACM components.

#### [7.49.](#) **networkAccessLevelType**

elementId: TBD  
name: networkAccessLevelType  
dataType: string  
status: current  
description: A set of types that expresses categories of network access-levels (e.g. block, quarantine, etc.).





**[7.50.](#) networkId**

elementId: TBD  
name: networkId  
dataType: string  
status: current  
description: Most networks such as AS, OSBF domains,  
or VLANs can have an ID.

**[7.51.](#) networkInterfaceName**

elementId: TBD  
name: networkInterfaceName  
dataType: string  
status: current  
description: A label that uniquely identifies an interface  
associated with a distinguishable endpoint.

**[7.52.](#) networkLayer**

elementId: TBD  
name: networkLayer  
dataType: string  
status: current  
description: A set of layers that expresses the specific  
network layer an interface operates on.

**[7.53.](#) networkName**

elementId: TBD  
name: networkName  
dataType: string  
status: current  
description: A label that is associated with a network.  
Some networks, for example, effective layer2-broadcast-domains  
are difficult to "grasp" and therefore quite difficult to name.

**[7.54.](#) organizationId**

elementId: TBD  
name: organizationId  
dataType: string  
status: current  
description: A label that uniquely identifies an  
organization via a PEN.



**[7.55.](#) osComponent**

elementId: TBD  
name: osComponent  
dataType: string  
status: current  
description: A label that references a "sub-component" that is part of the operating system (e.g. a kernel module, microcode, or ACPI table).

**[7.56.](#) osLabel**

elementId: TBD  
name: osLabel  
dataType: string  
status: current  
description: A label that references a specific version of an operating system, including patches and hotfixes.

**[7.57.](#) osName**

elementId: TBD  
name: osName  
dataType: string  
status: current  
description: The name of an operating system.

**[7.58.](#) osType**

elementId: TBD  
name: osType  
dataType: string  
status: current  
description: A set of types that identifies the type of an operating system (e.g. real-time, security-enhanced, consumer, server).

**[7.59.](#) osVersion**

elementId: TBD  
name: osVersion  
dataType: string  
status: current  
description: A value that represents the version of an operating-system.



**[7.60.](#) patchId**

elementId: TBD  
name: patchId  
dataType: string  
status: current  
description: A label the uniquely identifies a specific software patch.

**[7.61.](#) patchName**

elementId: TBD  
name: osVersion  
dataType: string  
status: current  
description: The vendor's name of a software patch.

**[7.62.](#) personFirstName**

elementId: TBD  
name: patchId  
dataType: string  
status: current  
description: The first name of a natural person.

**[7.63.](#) personLastName**

elementId: TBD  
name: personLastName  
dataType: string  
status: current  
description: The last name of a natural person.

**[7.64.](#) personMiddleName**

elementId: TBD  
name: personMiddleName  
dataType: string  
status: current  
description: The middle name of a natural person.

**[7.65.](#) phoneNumber**



elementId: TBD  
name: phoneNumber  
dataType: string  
status: current  
description: A label that expresses the U.S. national phone number (e.g. pattern value="((\d{3}) )?\d{3}-\d{4}").

#### [7.66.](#) **phoneNumberType**

elementId: TBD  
name: phoneNumberType  
dataType: string  
status: current  
description: A set of types that express the type of a phone number (e.g. DSN, Fax, Home, Mobile, Pager, Secure, Unsecure, Work, Other).

#### [7.67.](#) **privilegeName**

elementId: TBD  
name: privilegeName  
dataType: string  
status: current  
description: The attribute name of the privilege represented as an AVP.

#### [7.68.](#) **privilegeValue**

elementId: TBD  
name: privilegeValue  
dataType: string  
status: current  
description: The value content of the privilege represented as an AVP.

#### [7.69.](#) **protocol**

elementId: TBD  
name: protocol  
dataType: string  
status: current  
description: A set of types that defines specific protocols above layer 4 (e.g. http, https, dns, ipp, or unknown).





**[7.70.](#) publicKey**

elementId: TBD  
name: publicKey  
dataType: string  
status: current  
description: The value of a public key (regardless of its method of creation, crypto-system, or signature scheme) that can be collected from a target endpoint.

**[7.71.](#) relationshipContentElementGuid**

elementId: TBD  
name: relationshipContentElementGuid  
dataType: string  
status: current  
description: A reference to a specific content element used in a relationship subject.

**[7.72.](#) relationshipStatementElementGuid**

elementId: TBD  
name: relationshipStatementElementGuid  
dataType: string  
status: current  
description: A reference to a specific SACM statement used in a relationship subject.

**[7.73.](#) relationshipObjectLabel**

elementId: TBD  
name: relationshipObjectLabel  
dataType: string  
status: current  
description: A reference to a specific label used in content (e.g. a te-label or a user-id). This reference is typically used if matching content attribute can be done efficiently and can also be included in addition to a relationship-content-element-guid reference.

**[7.74.](#) relationshipType**



elementId: TBD  
name: relationshipType  
dataType: string  
status: current  
description: A set of types that is in every instance of a relationship subject to highlight what kind of relationship exists between the subject the relationship is included in (e.g. associated\_with\_user, applies\_to\_session, seen\_on\_interface, associated\_with\_flow, contains\_virtual\_device).

#### [7.75.](#) **roleName**

elementId: TBD  
name: roleName  
dataType: string  
status: current  
description: A label that references a collection of privileges assigned to a specific entity (identity? FIXME).

#### [7.76.](#) **sessionStateType**

elementId: TBD  
name: sessionStateType  
dataType: string  
status: current  
description: A set of types a discernible session (an ongoing network interaction) can be in (e.g. Authenticating, Authenticated, Postured, Started, Disconnected).

#### [7.77.](#) **statementGuid**

elementId: TBD  
name: statementGuid  
dataType: string  
status: current  
description: A label that expresses a global unique ID referencing a specific SACM statement that was produced by a SACM component.

#### [7.78.](#) **statementType**



elementId: TBD  
name: statementType  
dataType: string  
status: current  
description: A set of types that define the type of content that is included in a SACM statement (e.g. Observation, DirectoryContent, Correlation, Assessment, Guidance).

#### [7.79.](#) **status**

elementId: TBD  
name: status  
dataType: string  
status: current  
description: A set of types that defines possible result values for a finding in general (e.g. true, false, error, unknown, not applicable, not evaluated).

#### [7.80.](#) **subAdministrativeDomain**

elementId: TBD  
name: subAdministrativeDomain  
dataType: string  
status: current  
description: A label for related child domains an administrative domain can be composed of (used in the subject administrative-domain)

#### [7.81.](#) **subInterfaceLabel**

elementId: TBD  
name: subInterfaceLabel  
dataType: string  
status: current  
description: A unique label a sub network interface (e.g. a tagged vlan on a trunk) can be referenced with.

#### [7.82.](#) **superAdministrativeDomain**

elementId: TBD  
name: superAdministrativeDomain  
dataType: string  
status: current  
description: a label for related parent domains an administrative domain is part of (used in the subject s.administrative-domain).



**[7.83.](#) superInterfaceLabel**

elementId: TBD  
name: superInterfaceLabel  
dataType: string  
status: current  
description: a unique label a super network interface (e.g. a physical interface a tunnel interface terminates on) can be referenced with.

**[7.84.](#) teAssessmentState**

elementId: TBD  
name: teAssessmentState  
dataType: string  
status: current  
description: a set of types that defines the state of assessment of a target-endpoint (e.g. in-discovery, discovered, in-classification, classified, in-assessment, assessed).

**[7.85.](#) teLabel**

elementId: TBD  
name: teLabel  
dataType: string  
status: current  
description: an identifying label created from a set of identifying attributes used to reference a specific target endpoint.

**[7.86.](#) teId**

elementId: TBD  
name: teId  
dataType: string  
status: current  
description: an identifying label that is created randomly, is supposed to be unique, and used to reference a specific target endpoint.

**[7.87.](#) timestampType**





elementId: TBD  
name: timestampType  
dataType: string  
status: current  
description: a set of types that express what type of action or event happened at that point of time (e.g. discovered, classified, collected, published). Can be included in a generic s.timestamp subject.

#### **7.88. unitsReceived**

elementId: TBD  
name: unitsReceived  
dataType: string  
status: current  
description: a value that represents a number of units (e.g. frames, packets, cells or segments) received on a network interface.

#### **7.89. unitsSent**

elementId: TBD  
name: unitsSent  
dataType: string  
status: current  
description: a value that represents a number of units (e.g. frames, packets, cells or segments) sent on a network interface.

#### **7.90. username**

elementId: TBD  
name: username  
dataType: string  
status: current  
description: a part of the credentials required to access an account that can be collected from a target endpoint.

#### **7.91. userDirectory**



elementId: TBD  
name: userDirectory  
dataType: string  
status: current  
description: a label that identifies a specific type of user-directory (e.g. ldap, active-directory, local-user).

#### [7.92.](#) **userId**

elementId: TBD  
name: userId  
dataType: string  
status: current  
description: a label that references a specific user known in a SACM domain.

#### [7.93.](#) **webSite**

elementId: TBD  
name: webSite  
dataType: string  
status: current  
description: a URI that references a web-site.

#### [7.94.](#) **WGS84Longitude**

elementId: TBD  
name: WGS84Longitude  
dataType: float  
status: current  
description: a label that represents WGS 84 rev 2004 longitude.

#### [7.95.](#) **WGS84Latitude**

elementId: TBD  
name: WGS84Latitude  
dataType: float  
status: current  
description: a label that represents WGS 84 rev 2004 latitude.

#### [7.96.](#) **WGS84Altitude**



elementId: TBD  
name: WGS84Altitude  
dataType: float  
status: current  
description: a label that represents WGS 84 rev 2004 altitude.

#### **7.97. hardwareSerialNumber**

elementId: TBD  
name: hardwareSerialNumber  
dataType: string  
status: current  
description: A globally unique identifier for a particular piece of hardware assigned by the vendor.

#### **7.98. interfaceName**

elementId: TBD  
name: interfaceName  
dataType: string  
status: current  
description: A short name uniquely describing an interface, eg "Eth1/0". See [[RFC2863](#)] for the definition of the ifName object.

#### **7.99. interfaceIndex**

elementId: TBD  
name: interfaceIndex  
dataType: unsigned32  
status: current  
description: The index of an interface installed on an endpoint. The value matches the value of managed object 'ifIndex' as defined in [[RFC2863](#)]. Note that ifIndex values are not assigned statically to an interface and that the interfaces may be renumbered every time the device's management system is re-initialized, as specified in [[RFC2863](#)].

#### **7.100. interfaceMacAddress**

elementId: TBD  
name: interfaceMacAddress  
dataType: macAddress  
status: current  
description: The IEEE 802 MAC address associated with a network interface on an endpoint.



**7.101. interfaceType**

elementId: TBD  
 name: interfaceType  
 dataType: unsigned32  
 status: current  
 description: The type of a network interface. The value matches the value of managed object 'ifType' as defined in [IANA registry ianaiftype-mib].

**7.102. interfaceFlags**

elementId: TBD  
 name: interfaceFlags  
 dataType: unsigned16  
 status: current  
 description: This information element specifies the flags associated with a network interface. Possible values include:

structure: Up	; 0x1	; Interface is up.
Broadcast	; 0x2	; Broadcast address valid.
Debug	; 0x4	; Turn on debugging.
Loopback	; 0x8	; Is a loopback net.
Point-to-point	; 0x10	; Interface is point-to-point link.
No trailers	; 0x20	; Avoid use of trailers.
Resources allocated	; 0x40	; Resources allocated.
No ARP	; 0x80	; No address resolution protocol.
Receive all	; 0x100	; Receive all packets.

**7.103. networkInterface**

elementId: TBD  
 name: networkInterface  
 dataType: orderedList  
 status: current  
 description: Information about a network interface installed on an endpoint. The following high-level diagram describes the structure of networkInterface information element.

structure: orderedList(interfaceName, interfaceIndex, macAddress, ifType, flags)





**7.104. softwareIdentifier**

elementId: TBD  
name: softwareIdentifier  
dataType: string  
status: current  
description: A globally unique identifier for a particular software application.

**7.105. softwareTitle**

elementId: TBD  
name: softwareTitle  
dataType: string  
status: current  
description: The title of the software application.

**7.106. softwareCreator**

elementId: TBD  
name: softwareCreator  
dataType: string  
status: current  
description: The software developer (e.g., vendor or author).

**7.107. simpleSoftwareVersion**

elementId: TBD  
name: simpleSoftwareVersion  
dataType: string  
status: current  
description: The version string for a software application that conforms to the format of a list of hierarchical non-negative integers separated by a single character delimiter format.

**7.108. rpmSoftwareVersion**

elementId: TBD  
name: rpmSoftwareVersion  
dataType: string  
status: current  
description: The version string for a software application that conforms to the EPOCH:VERSION-RELEASE format.



**7.109. ciscoTrainSoftwareVersion**

elementId: TBD  
name: ciscoTrainSoftwareVersion  
dataType: string  
status: current  
description: The version string for a software application that conforms to the Cisco IOS Train string format.

**7.110. softwareVersion**

elementId: TBD  
name: softwareVersion  
dataType: list  
status: current  
description: The version of the software application. Software applications may be versioned using a number of schemas. The following high-level diagram describes the structure of the softwareVersion information element.  
structure: list(simpleSoftwareVersion | rpmSoftwareVersion | ciscoTrainSoftwareVersion)

**7.111. lastUpdated**

elementId: TBD  
name: lastUpdated  
dataType: dateTimeSeconds  
status: current  
description: The date and time when the software instance was last updated on the system (e.g., new version installed or patch applied)

**7.112. softwareInstance**

elementId: TBD  
name: softwareInstance  
dataType: orderedList  
status: current  
description: Information about an instance of software installed on an endpoint. The following high-level diagram describes the structure of softwareInstance information element.  
structure: orderedList(softwareIdentifier, title, creator, softwareVersion, lastUpdated)



**[7.113.](#) globallyUniqueIdentifier**

elementId: TBD  
name: globallyUniqueIdentifier  
dataType: unsigned8  
status: current  
metadata: true  
description: TODO.

**[7.114.](#) dataOrigin**

elementId: TBD  
name: dataOrigin  
dataType: string  
status: current  
metadata: true  
description: The origin of the data.

**[7.115.](#) dataSource**

elementId: TBD  
name: dataSource  
dataType: string  
status: current  
metadata: true  
description: The source of the data.

**[7.116.](#) creationTimestamp**

elementId: TBD  
name: creationTimestamp  
dataType: dateTimeSeconds  
status: current  
metadata: true  
description: The date and time when the posture  
information was created by a SACM Component.

**[7.117.](#) collectionTimestamp**

elementId: TBD  
name: collectionTimestamp  
dataType: dateTimeSeconds  
status: current  
metadata: true  
description: The date and time when the posture  
information was collected or observed by a SACM  
Component.



**7.118. publicationTimestamp**

elementId: TBD  
name: publicationTimestamp  
dataType: dateTimeSeconds  
status: current  
metadata: true  
description: The date and time when the posture information was published.

**7.119. relayTimestamp**

elementId: TBD  
name: relayTimestamp  
dataType: dateTimeSeconds  
status: current  
metadata: true  
description: The date and time when the posture information was relayed to another SACM Component.

**7.120. storageTimestamp**

elementId: TBD  
name: storageTimestamp  
dataType: dateTimeSeconds  
status: current  
metadata: true  
description: The date and time when the posture information was stored in a Repository.

**7.121. type**

elementId: TBD  
name: type  
dataType: enumeration  
status: current  
metadata: true  
description: The type of data model use to represent some set of endpoint information. The following table lists the set of data models supported by SACM.  
structure: TBD

**7.122. protocolIdentifier**





elementId: TBD  
name: protocolIdentifier  
dataType: unsigned8  
status: current  
description: The value of the protocol number in the IP packet header. The protocol number identifies the IP packet payload type. Protocol numbers are defined in the IANA Protocol Numbers registry.

In Internet Protocol version 4 (IPv4), this is carried in the Protocol field. In Internet Protocol version 6 (IPv6), this is carried in the Next Header field in the last extension header of the packet.

#### **7.123. sourceTransportPort**

elementId: TBD  
name: sourceTransportPort  
dataType: unsigned16  
status: current  
description: The source port identifier in the transport header. For the transport protocols UDP, TCP, and SCTP, this is the source port number given in the respective header. This field MAY also be used for future transport protocols that have 16-bit source port identifiers.

#### **7.124. sourceIPv4PrefixLength**

elementId: TBD  
name: sourceIPv4PrefixLength  
dataType: unsigned8  
status: current  
description: The number of contiguous bits that are relevant in the sourceIPv4Prefix Information Element.

#### **7.125. ingressInterface**



elementId: TBD  
name: ingressInterface  
dataType: unsigned32  
status: current  
description: The index of the IP interface where packets of this Flow are being received. The value matches the value of managed object 'ifIndex' as defined in [\[RFC2863\]](#). Note that ifIndex values are not assigned statically to an interface and that the interfaces may be renumbered every time the device's management system is re-initialized, as specified in [\[RFC2863\]](#).

#### **[7.126.](#) destinationTransportPort**

elementId: TBD  
name: destinationTransportPort  
dataType: unsigned16  
status: current  
description: The destination port identifier in the transport header. For the transport protocols UDP, TCP, and SCTP, this is the destination port number given in the respective header. This field MAY also be used for future transport protocols that have 16-bit destination port identifiers.

#### **[7.127.](#) sourceIPv6PrefixLength**

elementId: TBD  
name: sourceIPv6PrefixLength  
dataType: unsigned8  
status: current  
description: The number of contiguous bits that are relevant in the sourceIPv6Prefix Information Element.

#### **[7.128.](#) sourceIPv4Prefix**

elementId: TBD  
name: sourceIPv4Prefix  
dataType: ipv4Address  
status: current  
description: IPv4 source address prefix.

#### **[7.129.](#) destinationIPv4Prefix**



elementId: TBD  
name: destinationIPv4Prefix  
dataType: ipv4Address  
status: current  
description: IPv4 destination address prefix.

#### **7.130. sourceMacAddress**

elementId: TBD  
name: sourceMacAddress  
dataType: macAddress  
status: current  
description: The IEEE 802 source MAC address field.

#### **7.131. ipVersion**

elementId: TBD  
name: ipVersion  
dataType: unsigned8  
status: current  
description: The IP version field in the IP packet header.

#### **7.132. interfaceDescription**

elementId: TBD  
name: interfaceDescription  
dataType: string  
status: current  
description: The description of an interface, eg "FastEthernet  
1/0" or "ISP  
connection".

#### **7.133. applicationDescription**

elementId: TBD  
name: applicationDescription  
dataType: string  
status: current  
description: Specifies the description of an application.

#### **7.134. applicationId**

elementId: TBD  
name: applicationId  
dataType: octetArray  
status: current  
description: Specifies an Application ID per [[RFC6759](#)].



**7.135. applicationName**

elementId: TBD  
name: applicationName  
dataType: string  
status: current  
description: Specifies the name of an application.

**7.136. exporterIPv4Address**

elementId: TBD  
name: exporterIPv4Address  
dataType: ipv4Address  
status: current  
description: The IPv4 address used by the Exporting Process.  
This is used by the Collector to identify the  
Exporter in cases where the identity of the Exporter  
may have been obscured by the use of a proxy.

**7.137. exporterIPv6Address**

elementId: TBD  
name: exporterIPv6Address  
dataType: ipv6Address  
status: current  
description: The IPv6 address used by the Exporting Process.  
This is used by the Collector to identify the  
Exporter in cases where the identity of the  
Exporter may have been obscured by the use of a  
proxy.

**7.138. portId**

elementId: TBD  
name: portId  
dataType: unsigned32  
status: current  
description: An identifier of a line port that is unique per  
IPFIX Device hosting an Observation Point.  
Typically, this Information Element is used for  
limiting the scope of other Information Elements.

**7.139. templateId**





elementId: TBD  
name: templateId  
dataType: unsigned16  
status: current  
description: An identifier of a Template that is locally unique within a combination of a Transport session and an Observation Domain.

Template IDs 0-255 are reserved for Template Sets, Options Template Sets, and other reserved Sets yet to be created. Template IDs of Data Sets are numbered from 256 to 65535.

Typically, this Information Element is used for limiting the scope of other Information Elements. Note that after a re-start of the Exporting Process Template identifiers may be re-assigned.

#### [7.140.](#) collectorIPv4Address

elementId: TBD  
name: collectorIPv4Address  
dataType: ipv4Address  
status: current  
description: An IPv4 address to which the Exporting Process sends Flow information.

#### [7.141.](#) collectorIPv6Address

elementId: TBD  
name: collectorIPv6Address  
dataType: ipv6Address  
status: current  
description: An IPv6 address to which the Exporting Process sends Flow information.

#### [7.142.](#) informationElementIndex

elementId: TBD  
name: informationElementIndex  
dataType: unsigned16  
status: current  
description: A zero-based index of an Information Element referenced by informationElementId within a Template referenced by templateId; used to disambiguate scope for templates containing multiple identical Information Elements.



**7.143. informationElementId**

elementId: TBD  
name: informationElementId  
dataType: unsigned16  
status: current  
description: This Information Element contains the ID of another Information Element.

**7.144. informationElementDataType**

elementId: TBD  
name: informationElementDataType  
dataType: unsigned8  
status: current  
description: A description of the abstract data type of an IPFIX information element. These are taken from the abstract data types defined in [section 3.1](#) of the IPFIX Information Model [[RFC5102](#)]; see that section for more information on the types described in the informationElementDataType sub-registry.

These types are registered in the IANA IPFIX Information Element Data Type subregistry. This subregistry is intended to assign numbers for type names, not to provide a mechanism for adding data types to the IPFIX Protocol, and as such requires a Standards Action [[RFC5226](#)] to modify.

**7.145. informationElementDescription**



elementId: TBD  
name: informationElementDescription  
dataType: string  
status: current  
description: A UTF-8 [[RFC3629](#)] encoded Unicode string containing a human-readable description of an Information Element. The content of the informationElementDescription MAY be annotated with one or more language tags [[RFC4646](#)], encoded in-line [[RFC2482](#)] within the UTF-8 string, in order to specify the language in which the description is written. Description text in multiple languages MAY tag each section with its own language tag; in this case, the description information in each language SHOULD have equivalent meaning. In the absence of any language tag, the "i-default" [[RFC2277](#)] language SHOULD be assumed. See the Security Considerations section for notes on string handling for Information Element type records.

#### **[7.146.](#) informationElementName**

elementId: TBD  
name: informationElementName  
dataType: string  
status: current  
description: A UTF-8 [[RFC3629](#)] encoded Unicode string containing the name of an Information Element, intended as a simple identifier. See the Security Considerations section for notes on string handling for Information Element type records.

#### **[7.147.](#) informationElementRangeBegin**

elementId: TBD  
name: informationElementRangeBegin  
dataType: unsigned64  
status: current  
description: Contains the inclusive low end of the range of acceptable values for an Information Element.

#### **[7.148.](#) informationElementRangeEnd**



elementId: TBD  
name: informationElementRangeEnd  
dataType: unsigned64  
status: current  
description: Contains the inclusive high end of the range of acceptable values for an Information Element.

#### **[7.149.](#) informationElementSemantics**

elementId: TBD  
name: informationElementSemantics  
dataType: unsigned8  
status: current  
description: A description of the semantics of an IPFIX Information Element. These are taken from the data type semantics defined in [section 3.2](#) of the IPFIX Information Model [[RFC5102](#)]; see that section for more information on the types defined in the informationElementSemantics sub-registry. This field may take the values in Table ; the special value 0x00 (default) is used to note that no semantics apply to the field; it cannot be manipulated by a Collecting Process or File Reader that does not understand it a priori.

These semantics are registered in the IANA IPFIX Information Element Semantics subregistry. This subregistry is intended to assign numbers for semantics names, not to provide a mechanism for adding semantics to the IPFIX Protocol, and as such requires a Standards Action [[RFC5226](#)] to modify.

#### **[7.150.](#) informationElementUnits**





elementId: TBD  
name: informationElementUnits  
dataType: unsigned16  
status: current  
description: A description of the units of an IPFIX Information Element. These correspond to the units implicitly defined in the Information Element definitions in [section 5](#) of the IPFIX Information Model [[RFC5102](#)]; see that section for more information on the types described in the informationElementsUnits sub-registry. This field may take the values in Table 3 below; the special value 0x00 (none) is used to note that the field is unitless.

These types are registered in the IANA IPFIX Information Element Units subregistry; new types may be added on a First Come First Served [[RFC5226](#)] basis.

#### [7.151.](#) **userName**

elementId: TBD  
name: userName  
dataType: string  
status: current  
description: User name associated with the flow.

#### [7.152.](#) **applicationCategoryName**

elementId: TBD  
name: applicationCategoryName  
dataType: string  
status: current  
description: An attribute that provides a first level categorization for each Application ID.

#### [7.153.](#) **mibObjectValueInteger**



elementId: TBD  
name: mibObjectValueInteger  
dataType: signed64  
status: current  
description: An IPFIX Information Element which denotes that the integer value of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of Integer32 and INTEGER with IPFIX Reduced Size Encoding used as required. The value is encoded as per the standard IPFIX Abstract Data Type of signed64.

#### **[7.154.](#) mibObjectValueOctetString**

elementId: TBD  
name: mibObjectValueOctetString  
dataType: octetArray  
status: current  
description: An IPFIX Information Element which denotes that an Octet String or Opaque value of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of OCTET STRING and Opaque. The value is encoded as per the standard IPFIX Abstract Data Type of octetArray.

#### **[7.155.](#) mibObjectValueOID**



elementId: TBD  
name: mibObjectValueOID  
dataType: octetArray  
status: current  
description: An IPFIX Information Element which denotes that an Object Identifier or OID value of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of OBJECT IDENTIFIER. Note - In this case the "mibObjectIdentifier" will define which MIB object is being exported while the value contained in this Information Element will be an OID as a value. The mibObjectValueOID Information Element is encoded as ASN.1/BER [BER] in an octetArray.

#### **7.156. mibObjectValueBits**

elementId: TBD  
name: mibObjectValueBits  
dataType: octetArray  
status: current  
description: An IPFIX Information Element which denotes that a set of Enumerated flags or bits from a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of BITS. The flags or bits are encoded as per the standard IPFIX Abstract Data Type of octetArray, with sufficient length to accommodate the required number of bits. If the number of bits is not an integer multiple of octets then the most significant bits at end of the octetArray MUST be set to zero.

#### **7.157. mibObjectValueIPAddress**



elementId: TBD  
name: mibObjectValueIPAddress  
dataType: ipv4Address  
status: current  
description: An IPFIX Information Element which denotes that the IPv4 Address of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of IPAddress. The value is encoded as per the standard IPFIX Abstract Data Type of ipv4Address.

#### **7.158. mibObjectValueCounter**

elementId: TBD  
name: mibObjectValueCounter  
dataType: unsigned64  
status: current  
description: An IPFIX Information Element which denotes that the counter value of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of Counter32 or Counter64 with IPFIX Reduced Size Encoding used as required. The value is encoded as per the standard IPFIX Abstract Data Type of unsigned64.

#### **7.159. mibObjectValueGauge**

elementId: TBD  
name: mibObjectValueGauge  
dataType: unsigned32  
status: current  
description: An IPFIX Information Element which denotes that the Gauge value of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of Gauge32. The value is encoded as per the standard IPFIX Abstract Data Type of unsigned64. This value will represent a non-negative integer, which may increase or decrease, but shall never exceed a maximum value, nor fall below a minimum value.





**7.160. mibObjectValueTimeTicks**

elementId: TBD  
name: mibObjectValueTimeTicks  
dataType: unsigned32  
status: current  
description: An IPFIX Information Element which denotes that the TimeTicks value of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of TimeTicks. The value is encoded as per the standard IPFIX Abstract Data Type of unsigned32.

**7.161. mibObjectValueUnsigned**

elementId: TBD  
name: mibObjectValueUnsigned  
dataType: unsigned64  
status: current  
description: An IPFIX Information Element which denotes that an unsigned integer value of a MIB object will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with the Base Syntax of unsigned64 with IPFIX Reduced Size Encoding used as required. The value is encoded as per the standard IPFIX Abstract Data Type of unsigned64.

**7.162. mibObjectValueTable**



elementId: TBD  
name: mibObjectValueTable  
dataType: orderedList  
status: current  
description: An IPFIX Information Element which denotes that a complete or partial conceptual table will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with a SYNTAX of SEQUENCE. This is encoded as a subTemplateList of mibObjectValue Information Elements. The template specified in the subTemplateList MUST be an Options Template and MUST include all the Objects listed in the INDEX clause as Scope Fields.  
structure: orderedList(mibObjectValueRow+)

#### **7.163. mibObjectValueRow**

elementId: TBD  
name: mibObjectValueRow  
dataType: orderedList  
status: current  
description: An IPFIX Information Element which denotes that a single row of a conceptual table will be exported. The MIB Object Identifier ("mibObjectIdentifier") for this field MUST be exported in a MIB Field Option or via another means. This Information Element is used for MIB objects with a SYNTAX of SEQUENCE. This is encoded as a subTemplateList of mibObjectValue Information Elements. The subTemplateList exported MUST contain exactly one row (i.e., one instance of the subtemplate). The template specified in the subTemplateList MUST be an Options Template and MUST include all the Objects listed in the INDEX clause as Scope Fields.  
structure: orderedList(mibObjectValue+)

#### **7.164. mibObjectIdentifier**



elementId: TBD  
name: mibObjectIdentifier  
dataType: octetArray  
status: current  
description: An IPFIX Information Element which denotes that a MIB Object Identifier (MIB OID) is exported in the (Options) Template Record. The mibObjectIdentifier Information Element contains the OID assigned to the MIB Object Type Definition encoded as ASN.1/BER [BER].

#### **7.165. mibSubIdentifier**

elementId: TBD  
name: mibSubIdentifier  
dataType: unsigned32  
status: current  
description: A non-negative sub-identifier of an Object Identifier (OID).

#### **7.166. mibIndexIndicator**



elementId: TBD  
name: mibIndexIndicator  
dataType: unsigned64  
status: current  
description: This set of bit fields is used for marking the Information Elements of a Data Record that serve as INDEX MIB objects for an indexed Columnar MIB object. Each bit represents an Information Element in the Data Record with the n-th bit representing the n-th Information Element. A bit set to value 1 indicates that the corresponding Information Element is an index of the Columnar Object represented by the mibFieldValue. A bit set to value 0 indicates that this is not the case.

If the Data Record contains more than 64 Information Elements, the corresponding Template SHOULD be designed such that all INDEX Fields are among the first 64 Information Elements, because the mibIndexIndicator only contains 64 bits. If the Data Record contains less than 64 Information Elements, then the extra bits in the mibIndexIndicator for which no corresponding Information Element exists MUST have the value 0, and must be disregarded by the Collector. This Information Element may be exported with IPFIX Reduced Size Encoding.

#### [7.167](#). **mibCaptureTimeSemantics**





elementId: TBD  
name: mibCaptureTimeSemantics  
dataType: unsigned8  
status: current  
description: Indicates when in the lifetime of the flow the MIB value was retrieved from the MIB for a mibObjectIdentifier. This is used to indicate if the value exported was collected from the MIB closer to flow creation or flow export time and will refer to the Timestamp fields included in the same record. This field SHOULD be used when exporting a mibObjectValue that specifies counters or statistics.

If the MIB value was sampled by SNMP prior to the IPFIX Metering Process or Exporting Process retrieving the value (i.e., the data is already stale) and it's important to know the exact sampling time, then an additional observationTime\* element should be paired with the OID using structured data. Similarly, if different mibCaptureTimeSemantics apply to different mibObject elements within the Data Record, then individual mibCaptureTimeSemantics should be paired with each OID using structured data.

Values:

0. undefined
1. begin - The value for the MIB object is captured from the MIB when the Flow is first observed
2. end - The value for the MIB object is captured from the MIB when the Flow ends
3. export - The value for the MIB object is captured from the MIB at export time
4. average - The value for the MIB object is an average of multiple captures from the MIB over the observed life of the Flow

#### **7.168. mibContextEngineID**

elementId: TBD  
name: mibContextEngineID  
dataType: octetArray  
status: current  
description: A mibContextEngineID that specifies the SNMP engine ID for a MIB field being exported over IPFIX. Definition as per [\[RFC3411\] section 3.3](#).



**7.169. mibContextName**

elementId: TBD  
name: mibContextName  
dataType: string  
status: current  
description: This Information Element denotes that a MIB Context Name is specified for a MIB field being exported over IPFIX. Reference [\[RFC3411\] section 3.3](#).

**7.170. mibObjectName**

elementId: TBD  
name: mibObjectName  
dataType: string  
status: current  
description: The name (called a descriptor in [\[RFC2578\]](#)) of an object type definition.

**7.171. mibObjectDescription**

elementId: TBD  
name: mibObjectDescription  
dataType: string  
status: current  
description: The value of the DESCRIPTION clause of an MIB object type definition.

**7.172. mibObjectSyntax**

elementId: TBD  
name: mibObjectSyntax  
dataType: string  
status: current  
description: The value of the SYNTAX clause of an MIB object type definition, which may include a Textual Convention or Subtyping. See [\[RFC2578\]](#).

**7.173. mibModuleName**

elementId: TBD  
name: mibModuleName  
dataType: string  
status: current  
description: The textual name of the MIB module that defines a MIB Object.



**7.174. interface**

elementId: TBD  
name: interface  
dataType: list  
structure: list (InterfaceName, hwAddress, inetAddr, netmask)  
status: current  
description: Represents an interface and its configuration options.

**7.175. interfaceName**

elementId: TBD  
name: interfaceName  
dataType: string  
status: current  
description: The interface name.

**7.176. iflisteners**

elementId: TBD  
name: iflisteners  
dataType: list  
structure: list (interfaceName, physicalProtocol, hwAddress, programName, pid, userId)  
status: current  
description: Stores the results of checking for applications that are bound to an ethernet interface on the system.

**7.177. physicalProtocol**

elementId: TBD  
name: physicalProtocol  
dataType: enumeration  
structure:  
ETH\_P\_LOOP ; 0x1 ; Ethernet loopback packet.  
ETH\_P\_PUP ; 0x2 ; Xerox PUP packet.  
ETH\_P\_PUPAT ; 0x3 ; Xerox PUP Address Transport packet.  
ETH\_P\_IP ; 0x4 ; Internet protocol packet.  
ETH\_P\_X25 ; 0x5 ; CCITT X.25 packet.  
ETH\_P\_ARP ; 0x6 ; Address resolution packet.  
ETH\_P\_BPQ ; 0x7 ; G8BPQ AX.25 ethernet packet.  
ETH\_P\_IEEE8023PUP ; 0x8 ; Xerox IEEE802.3 PUP packet.  
ETH\_P\_IEEE8023PUPAT ; 0x9 ; Xerox IEEE802.3 PUP address transport packet.  
ETH\_P\_DEC ; 0xA ; DEC assigned protocol.  
ETH\_P\_DNA\_DL ; 0xB ; DEC DNA Dump/Load.



ETH\_P\_DNA\_RC ; 0xC ; DEC DNA Remote Console.  
ETH\_P\_DNA\_RT ; 0xD ; DEC DNA Routing.  
ETH\_P\_LAT ; 0xE ; DEC LAT.  
ETH\_P\_DIAG ; 0xF ; DEC Diagnostics.  
ETH\_P\_CUST ; 0x10 ; DEC Customer use.  
ETH\_P\_SCA ; 0x11 ; DEC Systems Comms Arch.  
ETH\_P\_RARP ; 0x12 ; Reverse address resolution packet.  
ETH\_P\_ATALK ; 0x13 ; Appletalk DDP.  
ETH\_P\_AARP ; 0x14 ; Appletalk AARP.  
ETH\_P\_8021Q ; 0x15 ; 802.1Q VLAN Extended Header.  
ETH\_P\_IPX ; 0x16 ; IPX over DIX.  
ETH\_P\_IPV6 ; 0x17 ; IPv6 over bluebook.  
ETH\_P\_SLOW ; 0x18 ; Slow Protocol. See 802.3ad 43B.  
ETH\_P\_WCCP ; 0x19 ; Web-cache coordination protocol.  
ETH\_P\_PPP\_DISC ; 0x1A ; PPPoE discovery messages.  
ETH\_P\_PPP\_SES ; 0x1B ; PPPoE session messages.  
ETH\_P\_MPLS\_UC ; 0x1C ; MPLS Unicast traffic.  
ETH\_P\_MPLS\_MC ; 0x1D ; MPLS Multicast traffic.  
ETH\_P\_ATMPOA ; 0x1E ; MultiProtocol Over ATM.  
ETH\_P\_ATMFATE ; 0x1F ; Frame-based ATM Transport over Ethernet.  
ETH\_P\_AOE ; 0x20 ; ATA over Ethernet.  
ETH\_P\_TIPC ; 0x21 ; TIPC.  
ETH\_P\_802\_3 ; 0x22 ; Dummy type for 802.3 frames.  
ETH\_P\_AX25 ; 0x23 ; Dummy protocol id for AX.25.  
ETH\_P\_ALL ; 0x24 ; Every packet.  
ETH\_P\_802\_2 ; 0x25 ; 802.2 frames.  
ETH\_P\_SNAP ; 0x26 ; Internal only.  
ETH\_P\_DDCMP ; 0x27 ; DEC DDCMP: Internal only  
ETH\_P\_WAN\_PPP ; 0x28 ; Dummy type for WAN PPP frames.  
ETH\_P\_PPP\_MP ; 0x29 ; Dummy type for PPP MP frames.  
ETH\_P\_PPPTALK ; 0x2A ; Dummy type for Atalk over PPP.  
ETH\_P\_LOCALTALK ; 0x2B ; Localtalk pseudo type.  
ETH\_P\_TR\_802\_2 ; 0x2C ; 802.2 frames.  
ETH\_P\_MOBITEX ; 0x2D ; Mobitex.  
ETH\_P\_CONTROL ; 0x2E ; Card specific control frames.  
ETH\_P\_IRDA ; 0x2F ; Linux-IrDA.  
ETH\_P\_ECONET ; 0x30 ; Acorn Econet.  
ETH\_P\_HDLC ; 0x31 ; HDLC frames.  
ETH\_P\_ARCNET ; 0x32 ; 1A for ArcNet.  
  ; 0x33 ; The empty string value is permitted here  
  to allow for detailed error reporting.

status: current

description: The physical layer protocol used by the AF\_PACKET socket.





**7.178. hwAddress**

elementId: TBD  
name: hwAddress  
dataType: string  
status: current  
description: The hardware address associated with the interface.

**7.179. programName**

elementId: TBD  
name: programName  
dataType: string  
status: current  
description: The name of the communicating program.

**7.180. userId**

elementId: TBD  
name: userId  
dataType: integer  
status: current  
description: The numeric user id.

**7.181. inetlisteningserver**

elementId: TBD  
name: inetlisteningserver  
dataType: list  
structure: list (transportProtocol, localAddress, localPort, localFullAddress, programName, foreignAddress, foreignPort, foreignFullAddress, pid, userId)  
status:  
    current  
description: Stores the results of checking for network servers currently active on a system. It holds information pertaining to a specific protocol-address-port combination.

**7.182. transportProtocol**

elementId: TBD  
name: transportProtocol  
dataType: string  
status: current  
description: The transport-layer protocol (tcp or udp).



**7.183. localAddress**

elementId: TBD  
name: localAddress  
dataType: ipAddress  
status: current  
description: This is the IP address being listened to. Note that the IP address can be IPv4 or IPv6.

**7.184. localPort**

elementId: TBD  
name: localPort  
dataType: integer  
status: current  
description: This is the TCP or UDP port being listened to.

**7.185. localFullAddress**

elementId: TBD  
name: localFullAddress  
dataType: string  
status: current  
description: The IP address and network port on which the program listens, including the local address and the local port. Note that the IP address can be IPv4 or IPv6.

**7.186. foreignAddress**

elementId: TBD  
name: foreignAddress  
dataType: ipAddressss  
status: current  
description: The IP address with which the program is communicating, or with which it will communicate. Note that the IP address can be IPv4 or IPv6.

**7.187. foreignFullAddress**

elementId: TBD  
name: foreignFullAddress  
dataType: ipAddressss  
status: current  
description: The IP address and network port to which the program is communicating or will accept communications from, including the foreign address and foreign port. Note that the IP address can be IPv4 or IPv6.



**7.188. selinuxboolean**

elementId: TBD  
name: selinuxboolean  
dataType: list  
structure: list (selinuxName, currentStatus,  
pendingStatus)  
status: current  
description: Describes the current and pending status of a  
SELinux boolean.

**7.189. selinuxName**

elementId: TBD  
name: selinuxName  
dataType: string  
status: current  
description: The name of the SELinux  
boolean.

**7.190. currentStatus**

elementId: TBD  
name: currentStatus  
dataType: boolean  
status: current  
description: Indicates current state of  
the specified SELinux boolean.

**7.191. pendingStatus**

elementId: TBD  
name: pendingStatus  
dataType: boolean  
status: current  
description: Indicates the pending  
state of the specified SELinux boolean.

**7.192. selinuxsecuritycontext**



elementId: TBD  
name: selinuxsecuritycontext  
dataType: list  
structure: list (filepath, path, filename, pid,  
username, role, domainType, lowSensitivity, lowCategory,  
highSensitivity, highCategory, rawlowSensitivity,  
rawlowCategory, rawhighSensitivity, rawhighCategory)  
status: current  
description: Describes the SELinux security  
context of a file or process on the local system.

#### [7.193.](#) **filepath**

elementId: TBD  
name: filepath  
dataType: string  
status: current  
description: Specifies the absolute path for a file on the  
machine. A directory cannot be specified as a filepath.

#### [7.194.](#) **path**

elementId: TBD  
name: path  
dataType: string  
status: current  
description: Specifies the directory component of  
the absolute path to a file on the machine.

#### [7.195.](#) **filename**

elementId: TBD  
name: filename  
dataType: string  
status: current  
description: The name of the file.

#### [7.196.](#) **pid**

elementId: TBD  
name: pid  
dataType: integer  
status: current  
description: The process ID of the  
process.





**7.197. role**

elementId: TBD  
name: role  
dataType: string  
status: current  
description: Specifies the types that a process  
may transition to (domain transitions).

**7.198. domainType**

elementId: TBD  
name: domainType  
dataType: string  
status: current  
description: Specifies the domain in which the file is accessible  
or the domain in which a process executes.

**7.199. lowSensitivity**

elementId: TBD  
name: lowSensitivity  
dataType: string  
status: current  
description: Specifies the current sensitivity of a file or  
process.

**7.200. lowCategory**

elementId: TBD  
name: lowCategory  
dataType: string  
status: current  
description: Specifies the set of  
categories associated with the low sensitivity.

**7.201. highSensitivity**

elementId: TBD  
name: highSensitivity  
dataType: string  
status: current  
description: Specifies the maximum  
range for a file or the clearance for a process.



**7.202. highCategory**

elementId: TBD  
name: highCategory  
dataType: string  
status: current  
description: Specifies the set of  
categories associated with the high sensitivity.

**7.203. rawlowSensitivity**

elementId: TBD  
name: rawlowSensitivity  
dataType: string  
status: current  
description: Specifies the current sensitivity of a file or  
process but in its raw context.

**7.204. rawlowCategory**

elementId: TBD  
name: rawlowCategory  
dataType: string  
status: current  
description: Specifies the set of categories associated with the  
low sensitivity but in its raw context.

**7.205. rawhighSensitivity**

elementId: TBD  
name: rawhighSensitivity  
dataType: string  
status: current  
description: Specifies the maximum range for a file or the  
clearance for a process but in its raw context.

**7.206. rawhighCategory**

elementId: TBD  
name: rawhighCategory  
dataType: string  
status: current  
description: Specifies the set of categories associated with the  
high sensitivity but in its raw context.



**7.207. systemdunitdependency**

elementId: TBD  
name: systemdunitdependency  
dataType: list  
structure: list (unit, dependency)  
status: current

description: Stores the dependencies of the systemd unit.

**7.208. unit**

elementId: TBD  
name: unit  
dataType: string  
status: current  
description: Refers to the full systemd unit name, which has a form of "\$name.\$type". For example "cupsd.service". This name is usually also the filename of the unit configuration file.

**7.209. dependency**

elementId: TBD  
name: dependency  
dataType: string  
status: current  
description: Refers to the name of a unit that was confirmed to be a dependency of the given unit.

**7.210. systemdunitproperty**

elementId: TBD  
name: systemdunitproperty  
dataType: list  
structure: list (unit, property, systemdunitValue)

status: current  
description: Stores the properties and values of a systemd unit.

**7.211. property**

elementId: TBD  
name: property  
dataType: string  
status: current  
description: The property associated with a systemd unit.



**7.212. systemdunitValue**

elementId: TBD  
name: systemdunitValue  
dataType: string  
status: current  
description: The value of the property associated with a systemd unit. Exactly one value shall be used for all property types except dbus arrays - each array element shall be represented by one value.

**7.213. file**

elementId: TBD  
name: file  
dataType: list  
structure: list (filepath, path, filename, fileType, userId, aTime, changeTime, mTime, size)  
status: current  
description: The metadata associated with a file on the endpoint.

**7.214. fileType**

elementId: TBD  
name: fileType  
dataType: string  
status: current  
description: The file's type (e.g., regular file (regular), directory, named pipe (fifo), symbolic link, socket or block special.)

**7.215. groupId**

elementId: TBD  
name: groupId  
dataType: integer  
status: current  
description: The group owner of the file, by group number.

**7.216. aTime**

elementId: TBD  
name: aTime  
dataType: timeStamp  
status: current  
description: The time that the file was last accessed.





**[7.217.](#) changeTime**

elementId: TBD  
name: changeTime  
dataType: timeStamp  
status: current  
description: The time of the last change  
to the file's inode.

**[7.218.](#) mTime**

elementId: TBD  
name: mTime  
dataType: timeStamp  
status: current  
description: The time of the last change to  
the file's contents.

**[7.219.](#) size**

elementId: TBD  
name: size  
dataType: integer  
status: current  
description: This is the size of the file in  
bytes.

**[7.220.](#) suid**

elementId: TBD  
name: suid  
dataType: boolean  
status: current  
description: Indicates whether the program runs with the uid  
(thus privileges) of the file's owner, rather than the calling  
user.

**[7.221.](#) sgid**

elementId: TBD  
name: sgid  
dataType: boolean  
status: current  
description: Indicates whether the program runs with the gid  
(thus privileges) of the file's group owner, rather than the  
calling user's group.



**7.222. sticky**

elementId: TBD  
name: sticky  
dataType: boolean  
status: current  
description: Indicates whether users can delete each other's files in this directory, when said directory is writable by those users.

**7.223. hasExtendedAcL**

elementId: TBD  
name: hasExtendedAcL  
dataType: boolean  
status: current  
description: Indicates whether the file or directory hasACL permissions applied to it. If a system supports ACLs and the file or directory doesn't have an ACL, or it matches the standard UNIX permissions, the entity will have a status of 'exists' and a value of 'false'. If the system supports ACLs and the file or directory has an ACL, the entity will have a status of 'exists' and a value of 'true'. Lastly, if a system doesn't support ACLs, the entity will have a status of 'does not exist'.

**7.224. inetd**

elementId: TBD  
name: inetd  
dataType: list  
structure: list (serviceProtocol, serviceName, serverProgram, serverArguments, endpointType, execAsUser, waitStatus)  
status: current  
description: Holds information associated with different Internet services.

**7.225. serverProgram**

elementId: TBD  
name: serverProgram  
dataType: string  
status: current  
description: Either the pathname of a server program to be invoked by inetd to perform the requested service, or the value internal if inetd itself provides the service.



**7.226. endpointType**

elementId: TBD  
name: endpointType  
dataType: enumeration  
structure:  
stream ; 0x1 ; The stream value is used to describe a stream socket.  
dgram ; 0x2 ; The dgram value is used to describe a datagram socket.  
raw ; 0x3 ; The raw value is used to describe a raw socket.  
seqpacket ; 0x4 ; The seqpacket value is used to describe a sequenced packet socket.  
tli ; 0x5 ; The tli value is used to describe all TLI endpoints.  
sunrpc\_tcp ; 0x6 ; The sunrpc\_tcp value is used to describe all SUNRPC TCP endpoints.  
sunrpc\_udp ; 0x7 ; The sunrpc\_udp value is used to describe all SUNRPC UDP endpoints.  
; 0x8 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: The endpoint type (aka, socket type) associated with the service.

**7.227. execAsUser**

elementId: TBD  
name: execAsUser  
dataType: string  
status: current  
description: The user id of the user the server program should run under.

**7.228. waitStatus**



elementId: TBD  
name: waitStatus  
dataType: enumeration  
structure: wait ; 0x1 ; The value of 'wait' specifies that the server that is invoked by inetd will take over the listening socket associated with the service, and once launched, inetd will wait for that server to exit, if ever, before it resumes listening for new service requests.

nowait ; 0x2 ; The value of 'nowait' specifies that the server that is invoked by inetd will not wait for any existing server to finish before taking over the listening socket associated with the service.

; 0x3 ; The empty string value is permitted here to allow for detailed error reporting.

status: current  
description: Specifies whether the server that is invoked by inetd will take over the listening socket associated with the service, and whether once launched, inetd will wait for that server to exit, if ever, before it resumes listening for new service requests. The legal values are "wait" or "nowait".

#### **7.229. inetAddr**

elementId: TBD  
name: inetAddr  
dataType: ipAddress  
status: current  
description: The IP address of the specific interface. Note that the IP address can be IPv4 or IPv6.

#### **7.230. netmask**

elementId: TBD  
name: netmask  
dataType: ipAddress  
status: current  
description: The bitmask used to calculate the interface's IP network.

#### **7.231. passwordInfo**





elementId: TBD  
name: passwordInfo  
dataType: list  
structure: list (username, password, userId, groupId, gcos,  
homeDir, loginShell, lastLogin)  
status: current  
description: Describes user account information for a  
system.

**7.232. username**

elementId: TBD  
name: username  
dataType: string  
status: current  
description: The name of the user.

**7.233. password**

elementId: TBD  
name: password  
dataType: string  
status: current  
description: The encrypted version of the  
user's password.

**7.234. gcos**

elementId: TBD  
name: gcos  
dataType: string  
status: current  
description:

**7.235. homeDir**

elementId: TBD  
name: homeDir  
dataType: string  
status: current  
description: The user's home  
directory.

**7.236. loginShell**



elementId: TBD  
name: loginShell  
dataType: string  
status: current  
description: The user's shell  
program.

#### [7.237.](#) **lastLogin**

elementId: TBD  
name: lastLogin  
dataType: integer  
status: current  
description: The date and time when the  
last login occurred.

#### [7.238.](#) **process**

elementId: TBD  
name: process  
dataType: list  
structure: list (commandLine, pid, ppid, priority, startTime)  
  
status: current  
description: Information about a process running on an endpoint.

#### [7.239.](#) **commandLine**

elementId: TBD  
name: commandLine  
dataType: string  
status: current  
description: The string used to start the  
process. This includes any parameters that are part of the  
command line.

#### [7.240.](#) **ppid**

elementId: TBD  
name: ppid  
dataType: integer  
status: current  
description: The process ID of the process's  
parent process.



**7.241. priority**

elementId: TBD  
name: priority  
dataType: integer  
status: current  
description: The scheduling priority with  
which the process runs.

**7.242. startTime**

elementId: TBD  
name: startTime  
dataType: string  
status: current  
description: The time of day the process  
started.

**7.243. routingtable**

elementId: TBD  
name: routingtable  
dataType: list  
structure: list (destination, gateway, flags,  
interfaceName)  
status: current  
description: Holds information about an individual routing table  
entry found in a system's primary routing table.

**7.244. destination**

elementId: TBD  
name: destination  
dataType: ipaddress  
status: current  
description: The destination IP address  
prefix of the routing table entry.

**7.245. gateway**

elementId: TBD  
name: gateway  
dataType: ipaddress  
status: current  
description: The gateway of the specified  
routing table entry.



**[7.246.](#) runlevelInfo**

elementId: TBD  
name: runlevelInfo  
dataType: list  
structure: list (serviceName, runlevel, start, kill)  
  
status: current  
description: Information about the start or kill state of a specified service at a given runlevel.

**[7.247.](#) runlevel**

elementId: TBD  
name: runlevel  
dataType: string  
status: current  
description: Specifies the system runlevel associated with a service.

**[7.248.](#) start**

elementId: TBD  
name: start  
dataType: boolean  
status: current  
description: Specifies whether the service is scheduled to start at the runlevel.

**[7.249.](#) kill**

elementId: TBD  
name: kill  
dataType: boolean  
status: current  
description: Specifies whether the service is scheduled to be killed at the runlevel.

**[7.250.](#) shadowItem**

elementId: TBD  
name: shadowItem  
dataType: list  
structure: list (username, password, chgLst, chgAllow, chgReq, expWarn, expInact, expDate, flags, encryptMethod)  
status: current  
description:





**[7.251.](#) chgLst**

elementId: TBD  
name: chgLst  
dataType: timeStamp  
status: current  
description: The date of the last password change.

**[7.252.](#) chgAllow**

elementId: TBD  
name: chgAllow  
dataType: integer  
status: current  
description: Specifies how often in days a user may change their password. It can also be thought of as the minimum age of a password.

**[7.253.](#) chgReq**

elementId: TBD  
name: chgReq  
dataType: integer  
status: current  
description: Describes how long a user can keep a password before the system forces her to change it.

**[7.254.](#) expWarn**

elementId: TBD  
name: expWarn  
dataType: integer  
status: current  
description: Describes how long before password expiration the system begins warning the user.

**[7.255.](#) expInact**

elementId: TBD  
name: expInact  
dataType: integer  
status: current  
description: Describes how many days of account inactivity the system will wait after a password expires before locking the account.



**7.256. expDate**

elementId: TBD  
name: expDate  
dataType: timeStamp  
status: current  
description: Specifies when will the  
account's password expire.

**7.257. encryptMethod**

elementId: TBD  
name: encryptMethod  
dataType: enumeration  
structure: DES ; 0x1 ; The DES method corresponds to the (none)  
prefix.  
    BSDi ; 0x2 ; The BSDi method corresponds to BSDi modified  
    DES or the '\_' prefix.  
    MD5 ; 0x3 ; The MD5 method corresponds to MD5 for Linux/BSD  
    or the \$1\$ prefix.  
    Blowfish ; 0x4 ; The Blowfish method corresponds to Blowfish  
    (OpenBSD) or the \$2\$ or \$2a\$ prefixes.  
    Sun MD5 ; 0x5 ; The Sun MD5 method corresponds to the \$md5\$  
    prefix.  
    SHA-256 ; 0x6 ; The SHA-256 method corresponds to the \$5\$  
    prefix.  
    SHA-512 ; 0x7 ; The SHA-512 method corresponds to the \$6\$  
    prefix. ; 0x8 ; The empty string value is permitted here to  
    allow for empty elements associated with variable references.  
status: current  
description: Describes method that is used for hashing  
passwords.

**7.258. symlink**

elementId: TBD  
name: symlink  
dataType: list  
structure: list (symlinkFilepath, canonicalPath)  
status: current

description: Identifies the result generated for a symlink.

**7.259. symlinkFilepath**



elementId: TBD  
name: symlinkFilepath  
dataType: string  
status: current  
description: Specifies the filepath to  
the subject symbolic link file.

#### [7.260.](#) **canonicalPath**

elementId: TBD  
name: canonicalPath  
dataType: string  
status: current  
description: Specifies the canonical  
path for the target of the symbolic link file specified by  
the filepath.

#### [7.261.](#) **sysctl**

elementId: TBD  
name: sysctl  
dataType: list  
structure: list (kernelParameterName, kernelParameterValue+,  
uname, machineClass, nodeName, osName, osRelease,  
osVersion, processorType)  
status: current  
description: Stores  
information retrieved from the local system about a kernel  
parameter and its respective value(s).

#### [7.262.](#) **kernelParameterName**

elementId: TBD  
name: kernelParameterName  
dataType: string  
status: current  
description: The name of a kernel  
parameter that was collected from the local system.

#### [7.263.](#) **kernelParameterValue**

elementId: TBD  
name: kernelParameterValue  
dataType: string  
status: current  
description: The current value(s)  
for the specified kernel parameter on the local system.



**7.264. uname**

elementId: TBD  
name: uname  
dataType: list  
structure: list (machineClass, nodeName, osName, osRelease,  
osVersion, processorType)  
status: current  
description: Information about the hardware the machine is running  
on.

**7.265. machineClass**

elementId: TBD  
name: machineClass  
dataType: string  
status: current  
description: Specifies the machine  
hardware name.

**7.266. nodeName**

elementId: TBD  
name: nodeName  
dataType: string  
status: current  
description: Specifies the host  
name.

**7.267. osName**

elementId: TBD  
name: osName  
dataType: string  
status: current  
description: Specifies the operating system  
name.

**7.268. osRelease**

elementId: TBD  
name: osRelease  
dataType: string  
status: current  
description: Specifies the build  
version.





**[7.269.](#) osVersion**

elementId: TBD  
name: osVersion  
dataType: string  
status: current  
description: Specifies the operating system  
version.

**[7.270.](#) processorType**

elementId: TBD  
name: processorType  
dataType: string  
status: current  
description: Specifies the processor  
type.

**[7.271.](#) internetService**

elementId: TBD  
name: internetService  
dataType: list  
structure: list (serviceProtocol, serviceName, flags,  
noAccess, onlyFrom, port, server, serverArguments,  
socketType, registeredServiceType, user, wait, disabled)  
  
status: current  
description: Holds information associated with Internet services.

**[7.272.](#) serviceProtocol**

elementId: TBD  
name: serviceProtocol  
dataType: string  
status: current  
description: Specifies the protocol  
that is used by the service.

**[7.273.](#) serviceName**

elementId: TBD  
name: serviceName  
dataType: string  
status: current  
description: Specifies the name of the  
service.



**7.274. flags**

elementId: TBD  
name: flags  
dataType: string  
status: current  
description: Specifies miscellaneous settings  
associated with the service with executing a program.

**7.275. noAccess**

elementId: TBD  
name: noAccess  
dataType: string  
status: current  
description: Specifies the remote hosts to  
which the service is unavailable.

**7.276. onlyFrom**

elementId: TBD  
name: onlyFrom  
dataType: ipAddress  
status: current  
description: Specifies the remote hosts to  
which the service is available.

**7.277. port**

elementId: TBD  
name: port  
dataType: integer  
status: current  
description: The port entity specifies the port  
used by the service.

**7.278. server**

elementId: TBD  
name: server  
dataType: string  
status: current  
description: Specifies the executable that is  
used to launch the service.



**7.279. serverArguments**

elementId: TBD  
name: serverArguments  
dataType: string  
status: current  
description: Specifies the arguments  
that are passed to the executable when launching the service.

**7.280. socketType**

elementId: TBD  
name: socketType  
dataType: string  
status: current  
description: Specifies the type of socket  
that is used by the service. Possible values include: stream,  
dgram, raw, or seqpacket.

**7.281. registeredServiceType**

elementId: TBD  
name: registeredServiceType  
dataType: enumeration  
structure: INTERNAL ; 0x1 ; The INTERNAL type is used to describe  
services like echo, chargen, and others whose functionality is  
supplied by xinetd itself.  
RPC ; 0x2 ; The RPC type is used to describe services that  
use remote procedure call ala NFS.  
UNLISTED ; 0x3 ; The UNLISTED type is used to describe  
services that aren't listed in /etc/protocols or /etc/rpc.  
TCPMUX ; 0x4 ; The TCPMUX type is used to describe services  
that conform to [RFC 1078](#). This type indicates that the service  
is responsible for handling the protocol handshake.  
TCPMUXPLUS ; 0x5 ; The TCPMUXPLUS type is used to describe  
services that conform to [RFC 1078](#). This type indicates that  
xinetd is responsible for handling the protocol  
handshake.  
; 0x6 ; The empty string value is permitted here to allow  
for detailed error reporting.  
status: current  
  
description: Specifies the type of internet service.



**[7.282.](#) wait**

elementId: TBD  
name: wait  
dataType: boolean  
status: current  
description: Specifies whether or not the service is single-threaded or multi-threaded and whether or not xinetd accepts the connection or the service accepts the connection. A value of 'true' indicates that the service is single-threaded and the service will accept the connection. A value of 'false' indicates that the service is multi-threaded and xinetd will accept the connection.

**[7.283.](#) disabled**

elementId: TBD  
name: disabled  
dataType: boolean  
status: current  
description: Specifies whether or not the service is disabled. A value of 'true' indicates that the service is disabled and will not start. A value of 'false' indicates that the service is not disabled.

**[7.284.](#) windowsView**

elementId: TBD  
name: windowsView  
dataType: enumeration  
structure: 32\_bit ; 0x1 ; Indicates the 32\_bit windows view.  
64\_bit ; 0x2 ; Indicates the 64\_bit windows view.  
; 0x3 ; The empty string value is permitted here to allow for empty elements associated with error conditions.  
status: current  
description: Indicates from which view (32-bit or 64-bit), the information was collected. A value of '32\_bit' indicates the Item was collected from the 32-bit view. A value of '64-bit' indicates the Item was collected from the 64-bit view.

**[7.285.](#) fileauditedpermissions**





elementId: TBD  
name: fileauditedpermissions  
dataType: list  
structure: list (filepath, path, filename, trusteeSid, trusteeName, auditStandardDelete, auditStandardReadControl, auditStandardWriteDac, auditStandardWriteOwner, auditStandardSynchronize, auditAccessSystemSecurity, auditGenericRead, auditGenericWrite, auditGenericExecute, auditGenericAll, auditFileReadData, auditFileWriteData, auditFileAppendData, auditFileReadEa, auditFileWriteEa, auditFileExecute, auditFileDeleteChild, auditFileReadAttributes, auditFileWriteAttributes, windowsView)  
status: current  
description: Stores the audited access rights of a file that a system access control list (SACL) structure grants to a specified trustee. The trustee's audited access rights are determined checking all access control entries (ACEs) in the SACL.

#### [7.286.](#) trusteeName

elementId: TBD  
name: trusteeName  
dataType: string  
status: current  
description: Specifies the trustee name. A trustee can be a user, group, or program (such as a Windows service).

#### [7.287.](#) auditStandardDelete



elementId: TBD  
name: auditStandardDelete  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: The right to delete the object.

#### **7.288. auditStandardReadControl**

elementId: TBD  
name: auditStandardReadControl  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: The right to read the information in the object's security descriptor, not including the information in the SACL.

#### **7.289. auditStandardWriteDac**



elementId: TBD  
name: auditStandardWriteDac  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: The right to modify the DACL in the object's security descriptor.

#### **7.290. auditStandardWriteOwner**

elementId: TBD  
name: auditStandardWriteOwner  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: The right to change the owner in the object's security descriptor.

#### **7.291. auditStandardSynchronize**



elementId: TBD  
name: auditStandardSynchronize  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: The right to use the object for synchronization. This enables a thread to wait until the object is in the signaled state. Some object types do not support this access right.

#### **7.292. auditAccessSystemSecurity**

elementId: TBD  
name: auditAccessSystemSecurity  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Indicates access to a system access control list (SACL).

#### **7.293. auditGenericRead**





elementId: TBD  
name: auditGenericRead  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Read access.

#### **7.294. auditGenericWrite**

elementId: TBD  
name: auditGenericWrite  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Write access.

#### **7.295. auditGenericExecute**



elementId: TBD  
name: auditGenericExecute  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Execute access.

#### **7.296. auditGenericAll**

elementId: TBD  
name: auditGenericAll  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Read, write, and execute access.

#### **7.297. auditFileReadData**



elementId: TBD  
name: auditFileReadData  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Grants the right to read data from the file.

#### **7.298. auditFileWriteData**

elementId: TBD  
name: auditFileWriteData  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Grants the right to write data to the file.

#### **7.299. auditFileAppendData**



elementId: TBD  
name: auditFileAppendData  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Grants the right to append data to the file.

#### **7.300. auditFileReadEa**

elementId: TBD  
name: auditFileReadEa  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Grants the right to read extended attributes.

#### **7.301. auditFileWriteEa**





elementId: TBD  
name: auditFileWriteEa  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Grants the right to write extended attributes.

### **7.302. auditFileExecute**

elementId: TBD  
name: auditFileExecute  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Grants the right to execute a file.

### **7.303. auditFileDeleteChild**



elementId: TBD  
name: auditFileDeleteChild  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Right to delete a directory and all the files it contains (its children), even if the files are read-only.

#### **7.304. auditFileReadAttributes**

elementId: TBD  
name: auditFileReadAttributes  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Grants the right to read file attributes.

#### **7.305. auditFileWriteAttributes**



elementId: TBD  
name: auditFileWriteAttributes  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description: Grants the right to change file attributes.

#### **7.306. fileeffectiverights**

elementId: TBD  
name: fileeffectiverights  
dataType: list  
structure: list (filepath, path, filename, trusteeSid, trusteeName, standardDelete, standardReadControl, standardWriteDac, standardWriteOwner, standardSynchronize, accessSystemSecurity, genericRead, genericWrite, genericExecute, genericAll, fileReadData, fileWriteData, fileAppendData, fileReadEa, fileWriteEa, fileExecute, fileDeleteChild, fileReadAttributes, fileWriteAttributes, windowsView)  
status: current  
description: Stores the effective rights of a file that a discretionary access control list (DACL) structure grants to a specified trustee. The trustee's effective rights are determined checking all access-allowed and access-denied access control entries (ACEs) in the DACL.

#### **7.307. standardDelete**

elementId: TBD  
name: standardDelete  
dataType: boolean  
status: current  
description: The right to delete the object.



**7.308. standardReadControl**

elementId: TBD  
name: standardReadControl  
dataType: boolean  
status: current  
description: The right to read  
the information in the object's security descriptor, not  
including the information in the SACL.

**7.309. standardWriteDac**

elementId: TBD  
name: standardWriteDac  
dataType: boolean  
status: current  
description: The right to modify the  
DACL in the object's security descriptor.

**7.310. standardWriteOwner**

elementId: TBD  
name: standardWriteOwner  
dataType: boolean  
status: current  
description: The right to change  
the owner in the object's security descriptor.

**7.311. standardSynchronize**

elementId: TBD  
name: standardSynchronize  
dataType: boolean  
status: current  
description: The right to use the  
object for synchronization. This enables a thread to wait  
until the object is in the signaled state. Some object  
types do not support this access right.

**7.312. accessSystemSecurity**

elementId: TBD  
name: accessSystemSecurity  
dataType: boolean  
status: current  
description: Indicates access to  
a system access control list (SACL).





**7.313. genericRead**

elementId: TBD  
name: genericRead  
dataType: boolean  
status: current  
description: Read access.

**7.314. genericWrite**

elementId: TBD  
name: genericWrite  
dataType: boolean  
status: current  
description: Write access.

**7.315. genericExecute**

elementId: TBD  
name: genericExecute  
dataType: boolean  
status: current  
description: Execute access.

**7.316. genericAll**

elementId: TBD  
name: genericAll  
dataType: boolean  
status: current  
description: Read, write, and execute access.

**7.317. fileReadData**

elementId: TBD  
name: fileReadData  
dataType: boolean  
status: current  
description: Grants the right to read data from the file

**7.318. fileWriteData**



elementId: TBD  
name: fileWriteData  
dataType: boolean  
status: current  
description: Grants the right to write  
data to the file.

#### **7.319. fileAppendData**

elementId: TBD  
name: fileAppendData  
dataType: boolean  
status: current  
description: Grants the right to  
append data to the file.

#### **7.320. fileReadEa**

elementId: TBD  
name: fileReadEa  
dataType: boolean  
status: current  
description: Grants the right to read  
extended attributes.

#### **7.321. fileWriteEa**

elementId: TBD  
name: fileWriteEa  
dataType: boolean  
status: current  
description: Grants the right to write  
extended attributes.

#### **7.322. fileExecute**

elementId: TBD  
name: fileExecute  
dataType: boolean  
status: current  
description: Grants the right to execute  
a file.

#### **7.323. fileDeleteChild**



elementId: TBD  
name: fileDeleteChild  
dataType: boolean  
status: current  
description: Right to delete a  
directory and all the files it contains (its children),  
even if the files are read-only.

#### **7.324. fileReadAttributes**

elementId: TBD  
name: fileReadAttributes  
dataType: boolean  
status: current  
description: Grants the right to  
read file attributes.

#### **7.325. fileWriteAttributes**

elementId: TBD  
name: fileWriteAttributes  
dataType: boolean  
status: current  
description: Grants the right to  
change file attributes.

#### **7.326. groupInfo**

elementId: TBD  
name: groupInfo  
dataType: list  
structure: list (group, username, subgroup)  
status: current  
description: Specifies the different users and subgroups, that  
directly belong to specific groups.

#### **7.327. group**

elementId: TBD  
name: group  
dataType: string  
status: current  
description: Represents the name of a particular  
group.



**[7.328.](#) user**

elementId: TBD  
name: user  
dataType: string  
status: current  
description: Represents the name of a particular user.

**[7.329.](#) subgroup**

elementId: TBD  
name: subgroup  
dataType: string  
status: current  
description: Represents the name of a particular subgroup in the specified group.

**[7.330.](#) groupSidInfo**

elementId: TBD  
name: groupSidInfo  
dataType: list  
structure: list (groupSid, userSid, subgroupSid)  
status:  
    current  
description: Specifies the different users and subgroups, that directly belong to specific groups (identified by SID).

**[7.331.](#) userSidInfo**

elementId: TBD  
name: userSidInfo  
dataType: list  
structure: list (userSid, enabled, groupSid, lastLogon)  
  
status: current  
description: Specifies the different groups (identified by SID) that a user belongs to.

**[7.332.](#) userSid**





elementId: TBD  
name: userSid  
dataType: string  
status: current  
description: Represents the SID of a particular user.

#### **7.333. subgroupSid**

elementId: TBD  
name: subgroupSid  
dataType: string  
status: current  
description: Represents the SID of a particular subgroup.

#### **7.334. lockoutpolicy**

elementId: TBD  
name: lockoutpolicy  
dataType: list  
structure: list (forceLogoff, lockoutDuration, lockoutObservationWindow, lockoutThreshold)  
status: current  
description: Specifies various attributes associated with lockout information for users and global groups in the security database.

#### **7.335. forceLogoff**

elementId: TBD  
name: forceLogoff  
dataType: integer  
status: current  
description: Specifies, in seconds, the amount of time between the end of the valid logon time and the time when the user is forced to log off the network.

#### **7.336. lockoutDuration**

elementId: TBD  
name: lockoutDuration  
dataType: integer  
status: current  
description: Specifies, in seconds, how long a locked account remains locked before it is automatically unlocked.



**7.337. lockoutObservationWindow**

elementId: TBD  
name: lockoutObservationWindow  
dataType: integer  
status: current  
description: Specifies the maximum time, in seconds, that can elapse between any two failed logon attempts before lockout occurs.

**7.338. lockoutThreshold**

elementId: TBD  
name: lockoutThreshold  
dataType: integer  
status: current  
description: Specifies the number of invalid password authentications that can occur before an account is marked "locked out."

**7.339. passwordpolicy**

elementId: TBD  
name: passwordpolicy  
dataType: list  
structure: list (maxPasswdAge, minPasswdAge, minPasswdLen, passwordHistLen, passwordComplexity, reversibleEncryption)  
status: current  
description: Specifies policy information associated with passwords.

**7.340. maxPasswdAge**

elementId: TBD  
name: maxPasswdAge  
dataType: integer  
status: current  
description: Specifies, in seconds (from a DWORD), the maximum allowable password age. A value of TIMEQ\_FOREVER (max DWORD value, 4294967295) indicates that the password never expires. The minimum valid value for this element is ONE\_DAY (86400). See the USER\_MODAL\_INFO\_0 structure returned by a call to NetUserModalsGet().



**7.341. minPasswdAge**

elementId: TBD  
name: minPasswdAge  
dataType: integer  
status: current  
description: Specifies the minimum number of seconds that can elapse between the time a password changes and when it can be changed again. A value of zero indicates that no delay is required between password updates.

**7.342. minPasswdLen**

elementId: TBD  
name: minPasswdLen  
dataType: integer  
status: current  
description: Specifies the minimum allowable password length. Valid values for this element are zero through PWLEN.

**7.343. passwordHistLen**

elementId: TBD  
name: passwordHistLen  
dataType: integer  
status: current  
description: Specifies the length of password history maintained. A new password cannot match any of the previous usrmod0\_password\_hist\_len passwords. Valid values for this element are zero through DEF\_MAX\_PWHIST.

**7.344. passwordComplexity**

elementId: TBD  
name: passwordComplexity  
dataType: boolean  
status: current  
description: Indicates whether passwords must meet the complexity requirements put forth by the operating system.

**7.345. reversibleEncryption**



elementId: TBD  
name: reversibleEncryption  
dataType: boolean  
status: current  
description: Indicates whether  
          or not passwords are stored using reversible encryption.

#### **[7.346.](#) portInfo**

elementId: TBD  
name: portInfo  
dataType: list  
structure: list (localAddress, localPort, transportProtocol,  
          pid, foreignAddress, foreignPort)  
status: current  
description: Information about open listening ports.

#### **[7.347.](#) foreignPort**

elementId: TBD  
name: foreignPort  
dataType: string  
status: current  
description: The TCP or UDP port to which  
          the program communicates.

#### **[7.348.](#) printereffectiverights**

elementId: TBD  
name: printereffectiverights  
dataType: list  
structure: list (printerName, trusteeSid,  
          standardDelete, standardReadControl, standardWriteDac,  
          standardWriteOwner, standardSynchronize,  
          accessSystemSecurity, genericRead, genericWrite,  
          genericExecute, genericAll, printerAccessAdminister,  
          printerAccessUse, jobAccessAdminister, jobAccessRead)  
status: current  
description: Stores the effective rights of a printer that a  
discretionary access control list (DACL) structure grants to a  
specified trustee. The trustee's effective rights are determined  
checking all access-allowed and access-denied access control  
entries (ACEs) in the DACL.





**[7.349.](#) printerName**

elementId: TBD  
name: printerName  
dataType: string  
status: current  
description: Specifies the name of the printer.

**[7.350.](#) printerAccessAdminister**

elementId: TBD  
name: printerAccessAdminister  
dataType: boolean  
status: current  
description:

**[7.351.](#) printerAccessUse**

elementId: TBD  
name: printerAccessUse  
dataType: boolean  
status: current  
description:

**[7.352.](#) jobAccessAdminister**

elementId: TBD  
name: jobAccessAdminister  
dataType: boolean  
status: current  
description:

**[7.353.](#) jobAccessRead**

elementId: TBD  
name: jobAccessRead  
dataType: boolean  
status: current  
description:

**[7.354.](#) registry**



elementId: TBD  
name: registry  
dataType: list  
structure: list (hive, key, registryKeyName, lastWriteTime,  
registryKeyType, registryKeyValue, windowsView)  
status: current  
description: Specifies information that can be  
collected about a particular registry key.

#### **7.355. hive**

elementId: TBD  
name: hive  
dataType: enumeration  
structure: HKEY\_CLASSES\_ROOT ; 0x1 ; This registry subtree  
contains information that associates file types with programs  
and configuration data for automation (e.g. COM  
objects and Visual Basic Programs).  
HKEY\_CURRENT\_CONFIG ; 0x2 ; This registry subtree contains  
configuration data for the current hardware profile.  
HKEY\_CURRENT\_USER ; 0x3 ; This registry subtree contains the  
user profile of the user that is currently logged into the  
system.  
HKEY\_LOCAL\_MACHINE ; 0x4 ; This registry subtree contains  
information about the local system.  
HKEY\_USERS ; 0x5 ; This registry subtree contains user-specific  
data.  
; 0x6 ; The empty string value is permitted here to allow  
for detailed error reporting.  
status: current  
description: The  
hive that the registry key belongs to.

#### **7.356. registryKey**

elementId: TBD  
name: registryKey  
dataType: string  
status: current  
description: Describes the registry key.  
Note that the hive portion of the string should not be  
included, as this data can be found under the hive  
element.



**7.357. registryKeyName**

elementId: TBD  
name: registryKeyName  
dataType: string  
status: current  
description: Describes the name of a registry key.

**7.358. lastWriteTime**

elementId: TBD  
name: lastWriteTime  
dataType: integer  
status: current  
description: The last time that the key or any of its value entries were modified. The value of this entity represents the FILETIME structure which is a 64-bit value representing the number of 100-nanosecond intervals since January 1, 1601 (UTC). Last write time can be queried on any key, with hives being classified as a type of key. When collecting only information about a registry hive or key the last write time will be the time the key or any of its entries were modified. When collecting only information about a registry name the last write time will be the time the containing key was modified. Thus when collecting information about a registry name, the last write time does not correlate directly to the specified name. See the RegQueryInfoKey function lpftLastWriteTime.

**7.359. registryKeyType**

elementId: TBD  
name: registryKeyType  
dataType: enumeration  
structure: reg\_binary ; 0x1 ; The reg\_binary type is used by registry keys that specify binary data in any form.  
reg\_dword ; 0x2 ; The reg\_dword type is used by registry keys that specify an unsigned 32-bit integer.  
reg\_dword\_little\_endian ; 0x3 ; The reg\_dword\_little\_endian type is used by registry keys that specify an unsigned 32-bit little-endian integer. It is designed to run on little-endian computer architectures.  
reg\_dword\_big\_endian ; 0x4 ; The reg\_dword\_big\_endian type is used by registry keys that specify an unsigned 32-bit big-endian integer. It is designed to run on big-endian computer architectures.



reg\_expand\_sz ; 0x5 ; The reg\_expand\_sz type is used by registry keys to specify a null-terminated string that contains unexpanded references to environment variables (for example, "%PATH%").

reg\_link ; 0x6 ; The reg\_link type is used by the registry keys for null-terminated unicode strings. It is related to target path of a symbolic link created by the RegCreateKeyEx function.

reg\_multi\_sz ; 0x7 ; The reg\_multi\_sz type is used by registry keys that specify an array of null-terminated strings, terminated by two null characters.

reg\_none; 0x8 ;

The reg\_none type is used by registry keys that have no defined value type.

reg\_qword; 0x9 ; The reg\_qword type is used by registry keys that specify an unsigned 64-bit integer.

reg\_qword\_little\_endian; 0xA ; The reg\_qword\_little\_endian type is used by registry keys that specify an unsigned 64-bit integer in little-endian computer architectures.

reg\_sz; 0xB ; The reg\_sz type is used by registry keys that specify a single null-terminated string.

reg\_resource\_list; 0xC ; The reg\_resource\_list type is used by registry keys that specify a resource list.

reg\_full\_resource\_descriptor; 0xD ; The reg\_full\_resource\_descriptor type is used by registry keys that specify a full resource descriptor.

reg\_resource\_requirements\_list; 0xE ; The reg\_resource\_requirements\_list type is used by registry keys that specify a resource requirements list.

; 0xF ; The empty string value is permitted here to allow for detailed error reporting.

status: current

description:

Specifies the type of data stored by the registry key.

### [7.360.](#) registryKeyValue





elementId: TBD  
name: registryKeyValue  
dataType: string  
status: current  
description: Holds the actual value of the specified registry key. The representation of the value as well as the associated datatype attribute depends on type of data stored in the registry key. If the value being tested is of type REG\_BINARY, then the datatype attribute should be set to 'binary' and the data represented by the value entity should follow the xsd:hexBinary form. (each binary octet is encoded as two hex digits) If the value being tested is of type REG\_DWORD, REG\_QWORD, REG\_DWORD\_LITTLE\_ENDIAN, REG\_DWORD\_BIG\_ENDIAN, or REG\_QWORD\_LITTLE\_ENDIAN then the datatype attribute should be set to 'int' and the value entity should represent the data as an unsigned integer. DWORD and QWORD values represent unsigned 32-bit and 64-bit integers, respectively. If the value being tested is of type REG\_EXPAND\_SZ, then the datatype attribute should be set to 'string' and the pre-expanded string should be represented by the value entity. If the value being tested is of type REG\_MULTI\_SZ, then only a single string (one of the multiple strings) should be tested using the value entity with the datatype attribute set to 'string'. In order to test multiple values, multiple OVAL registry tests should be used. If the specified registry key is of type REG\_SZ, then the datatype should be 'string' and the value entity should be a copy of the string. If the value being tested is of type REG\_LINK, then the datatype attribute should be set to 'string' and the null-terminated Unicode string should be represented by the value entity.

### **7.361. regkeyauditedpermissions**



elementId: TBD  
name: regkeyauditedpermissions  
dataType: list  
structure: list (key, trusteeSid, trusteeName, standardDelete, standardReadControl, standardWriteDac, standardWriteOwners, tandardSynchronize, accessSystemSecurity, genericRead, genericWrite, genericExecute, genericAll, keyQueryValue, keySetValue, keyCreateSubKey, keyEnumerateSubKeys, keyNotify, keyCreateLink, keyWow6464Key, keyWow6432Key, keyWow64Res, windowsView)  
status: current  
description: Stores the audited access rights of a registry key that a system access control list (SACL) structure grants to a specified trustee. The trustee's audited access rights are determined checking all access control entries (ACEs) in the SACL.

#### **7.362. auditKeyQueryValue**

elementId: TBD  
name: auditKeyQueryValue  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.363. auditKeySetValue**



elementId: TBD  
name: auditKeySetValue  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.364. auditKeyCreateSubKey**

elementId: TBD  
name: auditKeyCreateSubKey  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.365. auditKeyEnumerateSubKeys**



elementId: TBD  
name: auditKeyEnumerateSubKeys  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.366. auditKeyNotify**

elementId: TBD  
name: auditKeyNotify  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.367. auditKeyCreateLink**





elementId: TBD  
name: auditKeyCreateLink  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.368. auditKeyWow6464Key**

elementId: TBD  
name: auditKeyWow6464Key  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.369. auditKeyWow6432Key**



elementId: TBD  
name: auditKeyWow6432Key  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.370. auditKeyWow64Res**

elementId: TBD  
name: auditKeyWow64Res  
dataType: enumeration  
structure: AUDIT\_FAILURE ; 0x1 ; The audit type AUDIT\_FAILURE is used to perform audits on all unsuccessful occurrences of specified events when auditing is enabled.  
AUDIT\_NONE ; 0x2 ; The audit type AUDIT\_NONE is used to cancel all auditing options for the specified events.  
AUDIT\_SUCCESS ; 0x3 ; The audit type AUDIT\_SUCCESS is used to perform audits on all successful occurrences of the specified events when auditing is enabled.  
AUDIT\_SUCCESS\_FAILURE ; 0x4 ; The audit type AUDIT\_SUCCESS\_FAILURE is used to perform audits on all successful and unsuccessful occurrences of the specified events when auditing is enabled.  
; 0x5 ; The empty string value is permitted here to allow for detailed error reporting.  
status: current  
description:

#### **7.371. regkeyeffectiverights**



elementId: TBD  
name: regkeyeffectiverights  
dataType: list  
structure: list (hive, key, trusteeSid, trusteeName, standardDelete, standardReadControl, standardWriteDac, standardWriteOwner, standardSynchronize, accessSystemSecurity, genericRead, genericWrite, genericExecute, genericAll, keyQueryValue, keySetValue, keyCreateSubKey, keyEnumerateSubKeys, keyNotify, keyCreateLink, keyWow6464Key, keyWow6432Key, keyWow64Res, windowsView)  
status: current  
description: Stores the effective rights of a registry key that a discretionary access control list (DACL) structure grants to a specified trustee. The trustee's effective rights are determined checking all access-allowed and access-denied access control entries (ACEs) in the DACL.

#### [7.372.](#) **keyQueryValue**

elementId: TBD  
name: keyQueryValue  
dataType: boolean  
status: current  
description: Specifies whether or not permission is granted to query the key's value.

#### [7.373.](#) **keySetValue**

elementId: TBD  
name: keySetValue  
dataType: boolean  
status: current  
description: Specifies whether or not permission is granted to set the key's value.

#### [7.374.](#) **keyCreateSubKey**

elementId: TBD  
name: keyCreateSubKey  
dataType: boolean  
status: current  
description: Specifies whether or not permission is granted to create a subkey.



**[7.375.](#) keyEnumerateSubKeys**

elementId: TBD  
name: keyEnumerateSubKeys  
dataType: boolean  
status: current  
description: Specifies whether or  
not permission is granted to list the subkeys associated  
with key.

**[7.376.](#) keyNotify**

elementId: TBD  
name: keyNotify  
dataType: boolean  
status: current  
description:

**[7.377.](#) keyCreateLink**

elementId: TBD  
name: keyCreateLink  
dataType: boolean  
status: current  
description:

**[7.378.](#) keyWow6464Key**

elementId: TBD  
name: keyWow6464Key  
dataType: boolean  
status: current  
description:

**[7.379.](#) keyWow6432Key**

elementId: TBD  
name: keyWow6432Key  
dataType: boolean  
status: current  
description:

**[7.380.](#) keyWow64Res**





elementId: TBD  
name: keyWow64Res  
dataType: boolean  
status: current  
description:

#### **[7.381.](#) service**

elementId: TBD  
name: service  
dataType: list  
structure: list (serviceName, displayName, description,  
serviceType, tartType, currentState, controlsAccepted,  
startName, path, pid, serviceFlag, dependencies)  
status: current  
description: Stores information about Windows services that are  
present on the system.

#### **[7.382.](#) displayName**

elementId: TBD  
name: displayName  
dataType: string  
status: current  
description: Specifies the name of the  
service as specified in administrative tools.

#### **[7.383.](#) description**

elementId: TBD  
name: description  
dataType: string  
status: current  
description: Specifies the description of  
the service.

#### **[7.384.](#) serviceType**



elementId: TBD  
name: serviceType  
dataType: enumeration  
structure: SERVICE\_FILE\_SYSTEM\_DRIVER ; 0x1 ; The SERVICE\_FILE\_SYSTEM\_DRIVER type means that the service is a file system driver. The DWORD value that this corresponds to is 0x00000002.  
SERVICE\_KERNEL\_DRIVER ; 0x2 ; The SERVICE\_KERNEL\_DRIVER type means that the service is a driver. The DWORD value that this corresponds to is 0x00000001.  
SERVICE\_WIN32\_OWN\_PROCESS ; 0x3 ; The SERVICE\_WIN32\_OWN\_PROCESS type means that the service runs in its own process. The DWORD value that this corresponds to is 0x00000010.  
SERVICE\_WIN32\_SHARE\_PROCESS ; 0x4 ; The SERVICE\_WIN32\_SHARE\_PROCESS type means that the service runs in a process with other services. The DWORD value that this corresponds to is 0x00000020.  
SERVICE\_INTERACTIVE\_PROCESS ; 0x5 ; The SERVICE\_WIN32\_SHARE\_PROCESS type means that the service runs in a process with other services. The DWORD value that this corresponds to is 0x00000100.  
; 0x6 ; The empty string value is permitted here to allow for empty elements associated with error conditions.  
status: current  
description:  
    Specifies the type of the service.

### [7.385.](#) startType



elementId: TBD  
name: startType  
dataType: enumeration  
structure: SERVICE\_AUTO\_START ; 0x1 ; The SERVICE\_AUTO\_START type means that the service is started automatically by the Service Control Manager (SCM) during startup. The DWORD value that this corresponds to is 0x00000002.  
SERVICE\_BOOT\_START ; 0x2 ; The SERVICE\_BOOT\_START type means that the driver service is started by the system loader. The DWORD value that this corresponds to is 0x00000000.  
SERVICE\_DEMAND\_START ; 0x3 ; The SERVICE\_DEMAND\_START type means that the service is started by the Service Control Manager (SCM) when StartService() is called. The DWORD value that this corresponds to is 0x00000003.  
SERVICE\_DISABLED ; 0x4 ; The SERVICE\_DISABLED type means that the service cannot be started. The DWORD value that this corresponds to is 0x00000004.  
SERVICE\_SYSTEM\_START ; 0x5 ; The SERVICE\_SYSTEM\_START type means that the service is a device driver started by IoInitSystem(). The DWORD value that this corresponds to is 0x00000001.  
; 0x6 ; The empty string value is permitted here to allow for empty elements associated with error conditions.  
status: current  
description: Specifies when the service should be started.

### [7.386.](#) **currentState**



elementId: TBD  
name: currentState  
dataType: enumeration  
structure: SERVICE\_CONTINUE\_PENDING ; 0x1 ; The SERVICE\_CONTINUE\_PENDING type means that the service has been sent a command to continue, however, the command has not yet been executed. The DWORD value that this corresponds to is 0x00000005. SERVICE\_PAUSE\_PENDING ; 0x2 ; The SERVICE\_PAUSE\_PENDING type means that the service has been sent a command to pause, however, the command has not yet been executed. The DWORD value that this corresponds to is 0x00000006. SERVICE\_PAUSED ; 0x3 ; The SERVICE\_PAUSED type means that the service is paused. The DWORD value that this corresponds to is 0x00000007. SERVICE\_RUNNING ; 0x4 ; The SERVICE\_RUNNING type means that the service is running. The DWORD value that this corresponds to is 0x00000004. SERVICE\_START\_PENDING ; 0x5 ; The SERVICE\_START\_PENDING type means that the service has been sent a command to start, however, the command has not yet been executed. The DWORD value that this corresponds to is 0x00000002. SERVICE\_STOP\_PENDING ; 0x6 ; The SERVICE\_STOP\_PENDING type means that the service has been sent a command to stop, however, the command has not yet been executed. The DWORD value that this corresponds to is 0x00000003. SERVICE\_STOPPED ; 0x7 ; The SERVICE\_STOPPED type means that the service is stopped. The DWORD value that this corresponds to is 0x00000001. ; 0x8 ; The empty string value is permitted here to allow for empty elements associated with error conditions.  
status: current  
description: Specifies the current state of the service.

### **7.387. controlsAccepted**

elementId: TBD  
name: controlsAccepted  
dataType: enumeration structure: SERVICE\_ACCEPT\_NETBINDCHANGE ; 0x1 ; The SERVICE\_ACCEPT\_NETBINDCHANGE type means that the service is a network component and can accept changes in its binding without being stopped or restarted. The DWORD value that this corresponds to is 0x00000010. SERVICE\_ACCEPT\_PARAMCHANGE ; 0x2 ; The SERVICE\_ACCEPT\_PARAMCHANGE type means that the service can re-read its startup parameters without being stopped or restarted. The





DWORD value that this corresponds to is 0x00000008.  
SERVICE\_ACCEPT\_PAUSE\_CONTINUE ; 0x3 ; The SERVICE\_ACCEPT\_PAUSE\_CONTINUE type means that the service can be paused or continued. The DWORD value that this corresponds to is 0x00000002.  
SERVICE\_ACCEPT\_PRESHUTDOWN ; 0x4 ; The SERVICE\_ACCEPT\_PRESHUTDOWN type means that the service can receive pre-shutdown notifications. The DWORD value that this corresponds to is 0x00000100.  
SERVICE\_ACCEPT\_SHUTDOWN ; 0x5 ; The SERVICE\_ACCEPT\_SHUTDOWN type means that the service can receive shutdown notifications. The DWORD value that this corresponds to is 0x00000004.  
SERVICE\_ACCEPT\_STOP ; 0x6 ; The SERVICE\_ACCEPT\_STOP type means that the service can be stopped. The DWORD value that this corresponds to is 0x00000001.  
SERVICE\_ACCEPT\_HARDWAREPROFILECHANGE ; 0x7 ; The SERVICE\_ACCEPT\_HARDWAREPROFILECHANGE type means that the service can receive notifications when the system's hardware profile changes. The DWORD value that this corresponds to is 0x00000020.  
SERVICE\_ACCEPT\_POWEREVENT ; 0x8 ; The SERVICE\_ACCEPT\_POWEREVENT type means that the service can receive notifications when the system's power status has changed. The DWORD value that this corresponds to is 0x00000040.  
SERVICE\_ACCEPT\_SESSIONCHANGE ; 0x9 ; The SERVICE\_ACCEPT\_SESSIONCHANGE type means that the service can receive notifications when the system's session status has changed. The DWORD value that this corresponds to is 0x00000080.  
SERVICE\_ACCEPT\_TIMECHANGE ; 0xA ; The SERVICE\_ACCEPT\_TIMECHANGE type means that the service can receive notifications when the system time changes. The DWORD value that this corresponds to is 0x00000200.  
SERVICE\_ACCEPT\_TRIGGEREVENT ; 0xB ; The SERVICE\_ACCEPT\_TRIGGEREVENT type means that the service can receive notifications when an event that the service has registered for occurs on the system. The DWORD value that this corresponds to is 0x00000400.  
; 0xC ; The empty string value is permitted here to allow for empty elements associated with error conditions.

status: current

description: Specifies the control codes that a service will accept and process.



**7.388. startName**

elementId: TBD  
name: startName  
dataType: string  
status: current  
description: Specifies the account under  
which the process should run.

**7.389. serviceFlag**

elementId: TBD  
name: serviceFlag  
dataType: boolean  
status: current  
description: Specifies whether the  
service is in a system process that must always run (true)  
or if the service is in a non-system process or is not  
running (false).

**7.390. dependencies**

elementId: TBD  
name: dependencies  
dataType: string  
status: current  
description: Specifies the dependencies  
of this service on other services.

**7.391. serviceeffectiverights**

elementId: TBD  
name: serviceeffectiverights  
dataType: list  
structure: list (serviceName, trusteeSid,  
standardDelete, standardReadControl, standardWriteDac,  
standardWriteOwner, genericRead, genericWrite,  
genericExecute, serviceQueryConfs, erviceChangeConf,  
serviceQueryStat, serviceEnumDependents, serviceStart,  
serviceStop, servicePause, serviceInterrogate,  
serviceUserDefined)  
status: current  
description: Stores the  
effective rights of a service that a discretionary access  
control list (DACL) structure grants to a specified  
trustee. The trustee's effective rights are determined by  
checking all access-allowed and access-denied access  
control entries (ACEs) in the DACL.



**7.392. trusteeSid**

elementId: TBD  
name: trusteeSid  
dataType: string  
status: current  
description: Specifies the SID that is associated with a user, group, system, or program (such as a Windows service).

**7.393. serviceQueryConf**

elementId: TBD  
name: serviceQueryConf  
dataType: boolean  
status: current  
description: Specifies whether or not permission is granted to query the service configuration.

**7.394. serviceChangeConf**

elementId: TBD  
name: serviceChangeConf  
dataType: boolean  
status: current  
description: Specifies whether or not permission is granted to change service configuration.

**7.395. serviceQueryStat**

elementId: TBD  
name: serviceQueryStat  
dataType: boolean  
status: current  
description: Specifies whether or not permission is granted to query the service control manager about the status of the service.

**7.396. serviceEnumDependents**

elementId: TBD  
name: serviceEnumDependents  
dataType: boolean  
status: current  
description: Specifies whether or not permission is granted to query for an enumeration of all the services dependent on the service.



**7.397. serviceStart**

elementId: TBD  
name: serviceStart  
dataType: boolean  
status: current  
description: Specifies whether or not  
permission is granted to start the service.

**7.398. serviceStop**

elementId: TBD  
name: serviceStop  
dataType: boolean  
status: current  
description: Specifies whether or not  
permission is granted to stop the service.

**7.399. servicePause**

elementId: TBD  
name: servicePause  
dataType: boolean  
status: current  
description: Specifies whether or not  
permission is granted to pause or continue the service.

**7.400. serviceInterrogate**

elementId: TBD  
name: serviceInterrogate  
dataType: boolean  
status: current  
description: Specifies whether or not permission is granted to  
request the service to report its status immediately.

**7.401. serviceUserDefined**

elementId: TBD  
name: serviceUserDefined  
dataType: boolean  
status: current  
description: Specifies whether or  
not permission is granted to specify a user-defined  
control code.





**7.402. sharedresourceauditedpermissions**

elementId: TBD  
name: sharedresourceauditedpermissions  
dataType: list  
structure: list (netname, trusteeSid, standardDelete, standardReadControl, standardWriteDac, standardWriteOwner, standardSynchronize, accessSystemSecurity, genericRead, genericWrite, genericExecute, genericAll)  
status: current  
description: Stores the audited access rights of a shared resource that a system access control list (SACL) structure grants to a specified trustee. The trustee's audited access rights are determined checking all access control entries (ACEs) in the SACL.

**7.403. netname**

elementId: TBD  
name: netname  
dataType: string  
status: current  
description: Specifies the name associated with a particular shared resource.

**7.404. sharedresourceeffectiverights**

elementId: TBD  
name: sharedresourceeffectiverights  
dataType: list  
structure: list (netname, trusteeSid, standardDelete, standardReadControl, standardWriteDac, standardWriteOwner, standardSynchronize, accessSystemSecurity, genericRead, genericWrite, genericExecute, genericAll)  
status: current  
description: Stores the effective rights of a shared resource that a discretionary access control list (DACL) structure grants to a specified trustee. The trustee's effective rights are determined checking all access-allowed and access-denied access control entries (ACEs) in the DACL.



**[7.405.](#) user**

elementId: TBD  
name: user  
dataType: list  
structure: list (username, enabled, group, lastLogon)  
status: current  
description: Specifies the groups to which a user belongs.

**[7.406.](#) enabled**

elementId: TBD  
name: enabled  
dataType: boolean  
status: current  
description: Represents whether the particular user is enabled or not.

**[7.407.](#) lastLogon**

elementId: TBD  
name: lastLogon  
dataType: integer  
status: current  
description: The date and time when the last logon occurred.

**[7.408.](#) groupSid**

elementId: TBD  
name: groupSid  
dataType: string  
status: current  
description: Represents the SID of a particular group. If the specified user belongs to more than one group, then multiple groupSid elements are applicable. If the specified user is not a member of a single group, then a single groupSid element should be included with a status of 'does not exist'. If there is an error determining the groups that the user belongs to, then a single groupSid element should be included with a status of 'error'.

**[8.](#) Acknowledgements**

Many of the specifications in this document have been developed in a public-private partnership with vendors and end-users. The hard work



of the SCAP community is appreciated in advancing these efforts to their current level of adoption.

Over the course of developing the initial draft, Brant Cheikes, Matt Hansbury, Daniel Haynes, Scott Pope, Charles Schmidt, and Steve Venema have contributed text to many sections of this document.

## **9. IANA Considerations**

This document specifies an initial set of Information Elements for SACM in [Section 7](#). An Internet Assigned Numbers Authority (IANA) registry will be created and populated with the Information Elements in [Section 7](#). New assignments for SACM Information Elements will be administered by IANA through Expert Review [[RFC2434](#)]. The designated experts MUST check the requested Information Elements for completeness and accuracy of the submission with respect to the template and requirements expressed in [Section 4](#) and [Section 4.1](#). Requests for Information Elements that duplicate the functionality of existing Information Elements SHOULD be declined. The smallest available Information Element identifier SHOULD be assigned to a new Information Element. The definition of new Information Elements MUST be published using a well-established and persistent publication medium.

## **10. Security Considerations**

Posture Assessments need to be performed in a safe and secure manner. In that regard, there are multiple aspects of security that apply to the communications between components as well as the capabilities themselves. This information model only contains an initial listing of items that need to be considered with respect to security and will need to be augmented as the model continues to be developed.

Security considerations include:

**Authentication:** Every SACM Component and asset needs to be able to identify itself and verify the identity of other SACM Components and assets.

**Confidentiality:** Communications between SACM Components need to be protected from eavesdropping or unauthorized collection. Some communications between SACM Components and assets may need to be protected as well.

**Integrity:** The information exchanged between SACM Components needs to be protected from modification. Some exchanges between assets and SACM Components will also have this requirement.



Restricted Access: Access to the information collected, evaluated, reported, and stored should only be viewable and consumable to authenticated and authorized entities.

Considerations with respect to the operational aspects of collection, evaluation, and storage security automation information can be found in [Section 11](#).

Considerations concerning the privacy of security automation information can be found in [Section 12](#).

## **[11](#). Operational Considerations**

The following sections outline a series of operational considerations for SACM deployments within an organization. This section may be expanded to include other considerations as the WG gains additional operational experience with SACM deployments and extending the information model.

### **[11.1](#). Endpoint Designation**

In order to successfully carry out endpoint posture assessment, it is necessary to be able to identify the endpoints on a network and track the changes to them over time. Specifically, enabling SACM Components to:

- o Tell whether two endpoint attribute assertions concern the same endpoint
- o Respond to compliance measurements, for example by reporting, remediating, and quarantining (SACM does not specify these responses, but SACM exists to enable them).

Ideally, every endpoint would be identified by a unique identifier present on the endpoint, but, this is complicated due to different factors such as the variety of endpoints on a network, the ability of tools to reliably access such an identifier, and the ability of tools to correlate disparate identifiers. As a result, it is necessary for an endpoint to be identified by a set of attributes that uniquely identify it on a network. The set of attributes that uniquely identify an endpoint on a network will likely vary by organization; however, there are a number of properties to consider when selecting identifying attributes as some are better suited for identification purposes than others.

Multiplicity: Is the attribute typically associated with a single endpoint or with multiple endpoints? If the attribute is





associated with a single endpoint, it is better for identifying an endpoint on a network.

**Persistence:** How likely is the attribute to change? Does it never change? Does it only change when the endpoint is reprovisioned? Does it only change due to an event? Does it change on an ad-hoc and often unpredictable basis? Does it constantly change? The less likely it is for an attribute to change over time, the better it is for identifying an endpoint on a network.

**Immutability:** How difficult is it to change the attribute? Is the attribute hardware rooted and never changes? Can the attribute be changed by a user/process with the appropriate access? Can the attribute be changed without controlled access. The less likely an attribute is to change over time, the better chance it will be usable to identify an endpoint over time.

**Verifiable:** Can the attribute be corroborated? Can the attribute be externally verified with source authentication? Can the attribute be externally verified without source authentication? Is it impossible to externally verify the attribute. Attributes that can be externally verified are more likely to be accurate and are better for identifying endpoints on a network.

With that said, requiring SACM Components and end users to constantly refer to a set of attributes to identify an endpoint, is particularly burdensome. As a result, SACM supports the concept of a target endpoint label which associates an identifier (unique to a SACM domain) with the set of attributes used by an organization to identify endpoints on a network. Once defined for an endpoint, the target endpoint label can be used in place of the set of identifying attributes.

### **11.2. Timestamp Accuracy**

An organization will likely have different collectors deployed across the network that will be configured to collect posture attributes on varying frequencies (periodic, ad-hoc, event-driven, on endpoint, off endpoint, etc.). Some collectors will detect changes as soon as they occur whereas others will detect them at a later point during a periodic scan or when an event has triggered the collection of posture attributes. Furthermore, some changes will be detected on the endpoint and others will be observed off of the endpoint. As a result of these differences, the accuracy of the timestamp associated with the collected information will vary. For example, if a



collector is only running once every 12 hours, the change probably happened at some point in time prior to the scan and the timestamp is likely not accurate. Due to this, it is important for system administrators to determine if the accuracy of a timestamp is good enough for their intended purposes.

## **12. Privacy Considerations**

In the IETF, there are privacy concerns with respect to endpoint identity and monitoring. This is especially true when the activity on an endpoint can be linked to a particular person. For example, by correlating endpoint attributes such as usernames, certificates, etc. with browser activity, it may be possible to gain insight in to user behavior and trends beyond what is required to carry out endpoint posture assessments. In the hands of the wrong person, this information could be used to negatively influence a user's behavior or to plan attacks against the organization's infrastructure.

As a result, SACM data models should incorporate a mechanism by which an organization can designate which endpoint attributes are considered sensitive with respect to privacy. This will allow SACM Components to handle endpoint attributes in a manner consistent with the organization's privacy policies. Furthermore, organization's should put the proper mechanism in place to ensure endpoint attributes are protected when transmitted, stored, and accessed to ensure only authorized parties are granted access.

It should also be noted that some of this is often mitigated by organizational policies that require a user of an organization's network to consent to some level of monitoring in return for access to the network and other resources. The information that is monitored and collected will vary by organization and further highlights the need for a mechanism by which an organization can specify what constitutes privacy sensitive information for them.

## **13. References**

### **13.1. Normative References**

- [PEN] Internet Assigned Numbers Authority, "Private Enterprise Numbers", July 2016, <<https://www.iana.org/assignments/enterprise-numbers/enterprise-numbers>>.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.



## **13.2. Informative References**

- [I-D.ietf-sacm-requirements]  
Cam-Winget, N. and L. Lorenzin, "Secure Automation and Continuous Monitoring (SACM) Requirements", [draft-ietf-sacm-requirements-01](#) (work in progress), October 2014.
- [I-D.ietf-sacm-terminology]  
Waltermire, D., Montville, A., Harrington, D., and N. Cam-Winget, "Terminology for Security Assessment", [draft-ietf-sacm-terminology-05](#) (work in progress), August 2014.
- [RFC2434] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [RFC 2434](#), DOI 10.17487/RFC2434, October 1998, <<http://www.rfc-editor.org/info/rfc2434>>.
- [RFC3580] Congdon, P., Aboba, B., Smith, A., Zorn, G., and J. Roesse, "IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines", [RFC 3580](#), DOI 10.17487/RFC3580, September 2003, <<http://www.rfc-editor.org/info/rfc3580>>.
- [RFC4949] Shirey, R., "Internet Security Glossary, Version 2", FYI 36, [RFC 4949](#), DOI 10.17487/RFC4949, August 2007, <<http://www.rfc-editor.org/info/rfc4949>>.
- [RFC5209] Sangster, P., Khosravi, H., Mani, M., Narayan, K., and J. Tardo, "Network Endpoint Assessment (NEA): Overview and Requirements", [RFC 5209](#), DOI 10.17487/RFC5209, June 2008, <<http://www.rfc-editor.org/info/rfc5209>>.
- [RFC5793] Sahita, R., Hanna, S., Hurst, R., and K. Narayan, "PB-TNC: A Posture Broker (PB) Protocol Compatible with Trusted Network Connect (TNC)", [RFC 5793](#), DOI 10.17487/RFC5793, March 2010, <<http://www.rfc-editor.org/info/rfc5793>>.
- [RFC7012] Claise, B., Ed. and B. Trammell, Ed., "Information Model for IP Flow Information Export (IPFIX)", [RFC 7012](#), DOI 10.17487/RFC7012, September 2013, <<http://www.rfc-editor.org/info/rfc7012>>.
- [RFC7632] Waltermire, D. and D. Harrington, "Endpoint Security Posture Assessment: Enterprise Use Cases", [RFC 7632](#), DOI 10.17487/RFC7632, September 2015, <<http://www.rfc-editor.org/info/rfc7632>>.



## [Appendix A](#). Change Log

### [A.1](#). Changes in Revision 01

Added some proposed normative text.

For provenance:

Added a class "Method"

Added the produced-using relationship between an AVP and a method

Added the produced-by relationship between a Guidance and a SACM Component

Added the hosted-by relationship between a SACM Component and an Endpoint

asserted-by and summarized-by have been renamed to produced-by.

"User" is now "Account". If a user has different credentials, SACM cannot know that they belong to the same user. But, per Kim W, many organizations do have accounts that associate credentials.

The multiplicity of the based-on relationships has been corrected.

More relationships now have labels, per UML convention.

The diagram no longer has causal arrow. They had become redundant and were nonstandard and clutter.

Renamed "credential" to "identity", following industry usage. A credential includes proof, such as a key or password. A username or a distinguished name is called an "identity".

Removed Session, because an endpoint's network activity is not SACM's initial focus

Removed Authorization, for the same reason

Added many-to-many relationship between Hardware Component and Endpoint, for clarity

Added many-to-many relationship between Software Component and Endpoint, for clarity

Added "contains" relationship between Network Interface and Network Interface





Removed relationship between Network Interface and Account. The endpoint knows the identity it used to gain network access. The PDP also knows that. But they probably do not know the account.

Added relationship between Network Interface and Identity. The endpoint and the PDP will typically know the identity.

Made identity-to-account a many-to-one relationship.

## **[A.2.](#) Changes in Revision 02**

Added Section Identifying Attributes.

Split the figure into Figure Model of Endpoint and Figure Information Elements.

Added Figure Information Elements Take 2, proposing a triple-store model.

Some editorial cleanup

## **[A.3.](#) Changes in Revision 03**

Moved [Appendix A.1](#), [Appendix A.2](#), and Mapping to SACM Use Cases into the Appendix. Added a reference to it in [Section 1](#)

Added the [Section 4](#) section. Provided notes for the type of information we need to add in this section.

Added the [Section 6](#) section. Moved sections on Endpoint, Hardware Component, Software Component, Hardware Instance, and Software Instance there. Provided notes for the type of information we need to add in this section.

Removed the Provenance of Information Section. SACM is not going to solve provenance rather give organizations enough information to figure it out.

Updated references to the Endpoint Security Posture Assessment: Enterprise Use Cases document to reflect that it was published as an RFC.

Fixed the formatting of a few figures.

Included references to [[RFC3580](#)] where RADIUS is mentioned.



#### **[A.4.](#) Changes in Revision 04**

Integrated the IPFIX [[RFC7012](#)] syntax into [Section 4](#).

Converted many of the existing SACM Information Elements to the IPFIX syntax.

Included existing IPFIX Information Elements and datatypes that could likely be reused for SACM in [Section 7](#) and [Section 4](#) respectively.

Removed the sections related to reports as described in <https://github.com/sacmwg/draft-ietf-sacm-information-model/issues/30>.

Cleaned up other text throughout the document.

#### **[A.5.](#) Changes in Revision 05**

Merged proposed changes from the I-D IM into the WG IM (<https://github.com/sacmwg/draft-ietf-sacm-information-model/issues/41>).

Fixed some formatting warnings.

Removed a duplicate IE and added a few IE datatypes that were missing.

#### **[A.6.](#) Changes in Revision 06**

Clarified that the SACM statement and content-element subjects are conceptual and that they do not need to be explicitly defined in a data model as long as the necessary information is provided.

Updated the IPFIX syntax used to define Information Elements. There are still a couple of open issues that need to be resolved.

Updated some of the Information Elements contained in [Section 7](#) to use the revised IPFIX syntax. The rest of the Information Elements will be converted in a later revision.

Performed various clean-up and refactoring in Sections [6](#) and [7](#). Still need to go through [Section 8](#).

Removed appendices that were not referenced in the body of the draft. The text from them is still available in previous revisions of this document if needed.



### **A.7. Changes in Revision 07**

Made various changes to the IPFIX syntax based on discussions at the IETF 96 Meeting. Changes included the addition of a structure property to the IE specification template, the creation of an enumeration datatype, and the specification of an IE naming convention.

Provided text to define Collection Guidance, Evaluation Guidance, Classification Guidance, Storage Guidance, and Evaluation Results.

Included additional IEs related to software, configuration, and the vulnerability assessment scenario.

Added text for the IANA considerations, security considerations, operational considerations, and privacy considerations sections.

Performed various other editorial changes and clean-up.

#### Authors' Addresses

David Waltermire (editor)  
National Institute of Standards and Technology  
100 Bureau Drive  
Gaithersburg, Maryland 20877  
USA

Email: david.waltermire@nist.gov

Kim Watson  
United States Department of Homeland Security  
DHS/CS&C/FNR  
245 Murray Ln. SW, Bldg 410  
MS0613  
Washington, DC 20528  
USA

Email: kimberly.watson@hq.dhs.gov

Clifford Kahn  
Pulse Secure, LLC  
2700 Zanker Road, Suite 200  
San Jose, CA 95134  
USA

Email: cliffordk@pulsesecure.net



Lisa Lorenzin  
Pulse Secure, LLC  
2700 Zanker Road, Suite 200  
San Jose, CA 95134  
USA

Email: [llorenzin@pulsesecure.net](mailto:llorenzin@pulsesecure.net)

Michael Cokus  
The MITRE Corporation  
903 Enterprise Parkway, Suite 200  
Hampton, VA 23666  
USA

Email: [msc@mitre.org](mailto:msc@mitre.org)

Daniel Haynes  
The MITRE Corporation  
202 Burlington Road  
Bedford, MA 01730  
USA

Email: [dhaynes@mitre.org](mailto:dhaynes@mitre.org)

Henk Birkholz  
Fraunhofer SIT  
Rheinstrasse 75  
Darmstadt 64295  
Germany

Email: [henk.birkholz@sit.fraunhofer.de](mailto:henk.birkholz@sit.fraunhofer.de)



