

# SD-WAN Virtual Connection (SWVC) List of Application Flows Service Attribute

The SWVC List of Application Flows Service Attribute specifies the Application Flows that can be recognized by the SD-WAN service and information about how to identify IP Packets in each Application Flow. The value of the Service Attribute is a non-empty ordered list of 3-tuples (*appName*, *appCL*, *appGroup*) where:

- *appName* is an Identifier String that is used to refer to the Application Flow.
- *appCL* is a non-empty list of Application Flow Criteria 2-tuples of the form where:
  - *ACName* is an Identifier String containing an Application Flow Criterion Name from Table 4 or other Service Provider Application Flow Criterion Name.
  - *ACValue* contains the parameter values specific to the Application Flow Criterion specified in *ACName*. If there are no parameter values, *ACValue* is *none*.
- *appGroup* is an Application Flow Group name contained in the value of the SWVC List of Application Flow Groups Service Attribute or *none* if the Application Flow is not a member of an Application Flow Group.

**[R41]** Each Application Flow name, *appName*, in the value of the SWVC List of Application Flows Service Attribute **MUST** appear, at most, once.

**[R42]** Each Application Flow name, *appName*, in the value of the SWVC List of Application Flows Service Attribute **MUST NOT** be the same as an Application Flow Group Name in the value of the SWVC List of Application Flow Groups Service Attribute.

**[R43]** If the *appCL* element in an entry of the SWVC List of Application Flows Service Attribute contains more than one Application Flow Criterion, an Ingress IP Packet **MUST** match all Application Flow Criteria in order to be associated with the Application Flow.

**[R44]** Each Ingress IP Packet **MUST** be assigned to the first Application Flow in the value of the SWVC List of Application Flows Service Attribute whose Application Flow Criteria it matches, if any.

**[R45]** Any Ingress IP Packet that cannot be associated with an Application Flow from the value of the List of Application Flows Service Attribute **MUST** be discarded.

As shown in the example later in this section, the criteria for one Application Flow can be a subset of the criteria for another Application Flow, so the order that the Application Flows are matched, and hence the order of the Application Flow definitions in the value of this Service Attribute is important, and is one aspect of the agreed value of this Service Attribute.

[R43] indicates that the Application Flow is defined by the conjunction of a set of Application Flow Criteria. This doesn't allow for alternatives within an Application Flow. This is partially mitigated by the fact that many of the Criteria are ranges or lists of values. Also, the Application Flow Group can provide alternatives. For example, one Application Flow can have criteria X and Y, and a second Application Flow can have criteria X and W. If the two Application Flows are put into an Application Group, a common Policy can be applied to the Group and the two Applications can share bandwidth resources, so it appears (almost) like a single Application Flow defined as (X and Y) or (X and W).

**[R46]** Application Flow Criteria that can be used to describe Application Flows **MUST** include the Criteria listed in Table 4, except for APPID.

ACName	Layer	Match	Values for ACValue	Reference
ETHERTYPE	2	Ethertype	Integer in the range 0x0600 to 0xFFFF, e.g. 0x0800 for IPv4	802.3 [4]
CVLANS	2	C-VLAN ID List	Integer in the range 0 to 4094	802.1Q[3]
SAV4	3	IPv4 Source Address	IPv4 prefix	RFC 791 [5]
DAV4	3	IPv4 Destination Address	IPv4 prefix	RFC 791 [5]
SDAV4	3	IPv4 Source or Destination Address	IPv4 prefix	RFC 791 [5]
PROTV4	3	IPv4 Protocol List	List of integers in the range 0 to 255	IANA Protocol Numbers Registry [1]
SAV6	3	IPv6 Source Address	IPv6 prefix	RFC 8200 [17]
DAV6	3	IPv6 Destination Address	IPv6 prefix	RFC 8200 [17]
SDAV6	3	IPv6 Source or Destination Address	IPv6 prefix	RFC 8200 [17]
NEXT-HEADV6	3	IPv6 Next Header List	List of integers in the range 0 to 255	IANA Protocol Numbers Registry [1]
SPORT	4	TCP/UDP Source Port List	List of integers in the range 0 to 65535	IANA Service Name and Port Number Registry [2]
DPORT	4	TCP/UDP Destination Port List	List of integers in the range 0 to 65535	IANA Service Name and Port Number Registry [2]

## Status

PUBLISHED

## Study Requirement

MEF-SDCP Exam Study Reference

## Source(s) and Reference(s)

[MEF 70 - SD-WAN Service Attributes and Services Definition](#)

SDPORT	4	TCP/UDP Source or Destination Port List	List of integers in the range 0 to 65535	IANA Service Name and Port Number Registry [2]
APPID	4 - 7	Application Identifier	List of arguments starting with the Application Identifier.	Custom Match
ANY	1 - 7	Match Any IP Packet	No arguments	

Table 4 – Required Application Flow Criteria

Table 4 includes all of the basic layer 2 through layer 4 fields that all implementations are expected to be able to match against Ingress IP Packets. The exception is the *APPID* Criterion. The *APPID* Policy Criterion provides the ability for the Service Provider to define and name both simple and complex matches. These can include *standard* matches available to all of the Service Provider's Subscribers from a catalog and/or *custom* matches developed by the Service Provider by agreement with a particular Subscriber.

APPID matches could be simple protocol matches (that could be accomplished with the other Criteria such as DPORT) such as "SSH" or "SNMP" or "RTP", but they can also support deeper inspection of packets such as "SNMP GET NEXT" or "HTTP POST" or "TWAMP [15] STOP-SESSION".

**[R47]** If the Service Provider defines an APPID (either a standard or a custom match), the description provided to the Subscriber **MUST** include the following information:

- The Application Identifier
- Addition Arguments Required (beyond the Identifier)
- Description of the operational logic of the match including the fields that are inspected, the values that they are matched against, and any additional logic associated with the match (e.g., dependencies).

Complex matches, for example, using deep packet inspection, often require inspection of several initial packets and may include heuristics to define the characteristics of the Application Flow. These details are included in the description of the matching logic required by [R47].

For example:

- An APPID with name SIP: There are no additional arguments required, and the match is performed by inspecting the TCP or UDP source and destination port for value 5060 or 5061.
- An APPID named SIPUSER: This includes an additional argument "user-id". The operation of this match is the same as SIP with the addition that if the port match is successful, the SIP *To* and *From* fields are matched against the "user-id".

The Application Flow Criterion *ANY* matches all IP Packets. This criterion allows an Application Flow to be defined that includes all "unmatched" IP Packets and assign a Policy to that Application Flow. In general, if this Application Flow Criterion is used, it should be in the last Application Flow definition in the list, since no IP Packets are matched against subsequent Application Flow definitions.

**[R48]** If an entry in the value of the SWVC List of Application Flows Service Attribute includes the Application Flow Criterion *ANY*, that entry **MUST NOT** contain any other Application Flow Criteria.

Following is an example value for this Service Attribute with four Application Flows:

```
[
<Peach, [<SAV4, 192.168.7.0/24>,<DPORT, [80,443,8080]>], round>
<VOIP, [<APPID,"RTP">], none>
<Banana, [<DPORT, [80]>], long>
<Else, [<ANY>], none>
]
```

In this example, Application Flow *Peach* includes packets from any 192.168.7.x address destined to port 80 or 443 or 8080 (and this flow is in the group *round*). Application Flow *VOIP* includes packets that are matched by the built in "RTP" flow match. Application Flow *Banana* is any packet to port 80 that is not matched by *Peach*, and this flow is in group *long*. At the end of the list is the Application Flow *Else*, which includes all IP Packets not matched by the other three.

In this example, it is important that *Banana* is after *Peach* because it matches a subset of *Peach*. If *Banana* were first, then port 80 packets would never be assigned to Application Flow *Peach*.

## Related and Further Reading

- [SWVC End Point Policy Map](#)
- [SD-WAN Virtual Connection \(SWVC\) Service Attributes](#)
- [SD-WAN UNI L2 Interface Service Attribute](#)
- [SD-WAN Virtual Connection \(SWVC\) Identifier Service Attribute](#)
- [SD-WAN Virtual Connection \(SWVC\) End Point List Service Attribute](#)
- [SD-WAN Virtual Connection \(SWVC\) Reserved Prefixes Service Attribute](#)
- [SD-WAN Virtual Connection \(SWVC\) Service Uptime Objective Service Attribute](#)
- [SD-WAN Virtual Connection \(SWVC\) List of Policies Service Attribute](#)
- [SD-WAN Virtual Connection \(SWVC\) List of Application Flows Service Attribute](#)
- [SD-WAN Virtual Connection \(SWVC\) End Point Service Attributes](#)
- [Defined: SD-WAN Service Attributes](#)
- [SD-WAN PUBLIC-PRIVATE Policy Criterion](#)
- [SD-WAN Service Attributes](#)
- [SD-WAN Virtual Connection \(SWVC\) Service Attributes](#)
- [SD-WAN Policy Criteria specification and interaction](#)
- [SD-WAN BILLING-METHOD Policy Criterion](#)
- [SD-WAN INTERNET-BREAKOUT Policy Criterion](#)
- [SD-WAN BACKUP Policy Criterion](#)
- [SWVC End Point Identifier Service Attribute](#)
- [Defined: SD-WAN UNI](#)

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