VoIP Service Definition

Abstract

This document contains a Service Definition example for Voice over IP to be used in the context of the overall TM Forum framework for Service Activation. The VoIP Service Definition description in this document will be used for the creation of a formal VoIP Service Definition expressed in XMLSchema. This document also includes an example of a Service Template and shows how it fits into the overall product/service context.

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1 Introduction

This document contains a Service Definition information model for Voice over IP (VoIP). The VoIP Service Definition will be used for, and is intended to be sufficient for, the creation of a formal VoIP Service Definition expressed in XMLSchema. This document also includes an example of a Service Template and shows how it fits into the overall product/service context.

The VoIP Service Definition is utilized within the context of the overall TM Forum framework for Service Activation. Service Activation refers to the activation of underlying service instances and associated resources needed to support a product instance purchased by a customer. The reader is assumed to be familiar with terms and concepts in the following documents:

- TM Forum518_SB, Service Basic DDP BA
- TM Forum518_SA_1, Service Activation DDP BA, Part 1: Overview
- TM Forum518_SA_2, Service Activation DDP BA, Part 2: Service Activation Interface
- SD2-0_mTOPDictionary, The mTOP Dictionary
- TMF612_SB, Service Basic IA specifications

The information model used here for the VoIP Service Definition is based on an extension of the TM Forum SID service model.

The VoIP Service Definition is intended to broadly support the set of potential VoIP Product Offers that service providers may create to sell to customers. The VoIP Service Definition could be used in part to derive Product Specifications, Product Offers, Service Templates and Customer Facing Services.

Other TM Forum documents may provide Service Definitions for other service domains such as IPTV or VPNs.

The reader should be mindful of the following caveats on scope:

- Any VoIP Service Definition is understandably never complete. It is to be expected that additional capabilities will be added over time. Moreover, the actual detail of what aspects of service a service provider chooses to expose to customers through product offers may differ, and the possibilities are virtually limitless. Thus, the VoIP Service Definition here should be considered as a good example that can be modified or extended by adding more ServiceSpecCharacteristics (SSCs) or changing the scope of potential ServiceSpecCharacteristicValues associated with existing SSCs.
- Since the VoIP Service Definition is an information model only for service activation, it does not fully describe all aspects of a VoIP service. For example, it doesn't describe how any particular application logic might work (e.g., for presence or user interaction or call distribution). And, for example, it doesn't address the area of service assurance.
- The boundaries of what constitutes VoIP Service are somewhat arbitrary; for example, one could elect to have it include IP Fax, or multimedia calls, or Instant Messaging (IM).
- Access methods (e.g., DSL, cable, wi-fi, Ethernet, satellite) are not included in this VoIP Service Definition example. Those are Service Access Components that would be addressed elsewhere. One could choose to include such underlying access methods in a VoIP Service Definition, but in general it is better to decouple them from the end-end VoIP service itself.
- The VoIP Service Definition focuses on what is potentially exposed to *users* of the corresponding Product Offers (i.e., those making/receiving the voice connections). Thus, for example, it does not

address aspects of the services for *subscribers* managing user privileges or changeable product parameters, or for agents of the customer who may be monitoring the service or reporting/tracking troubles.

- The very label “VoIP Service” implies an underlying technology and the possible scope of features enabled by that technology (as opposed to being PSTN-based, for example), although ideally one might instead consider “Voice Service” independent of any particular technologies.

2 Structure of the Service Definition

The overall mTOSI-SM UML information model that includes the ServiceDefinition entity is described in the TMF612_SB.

Figure 1 is an information model fragment that illustrates the few basic entities directly related to a Service Definition example. The entities shown have relationships with other entities that are part of the overall mTOSI-SM information model but that are not shown in the figure.

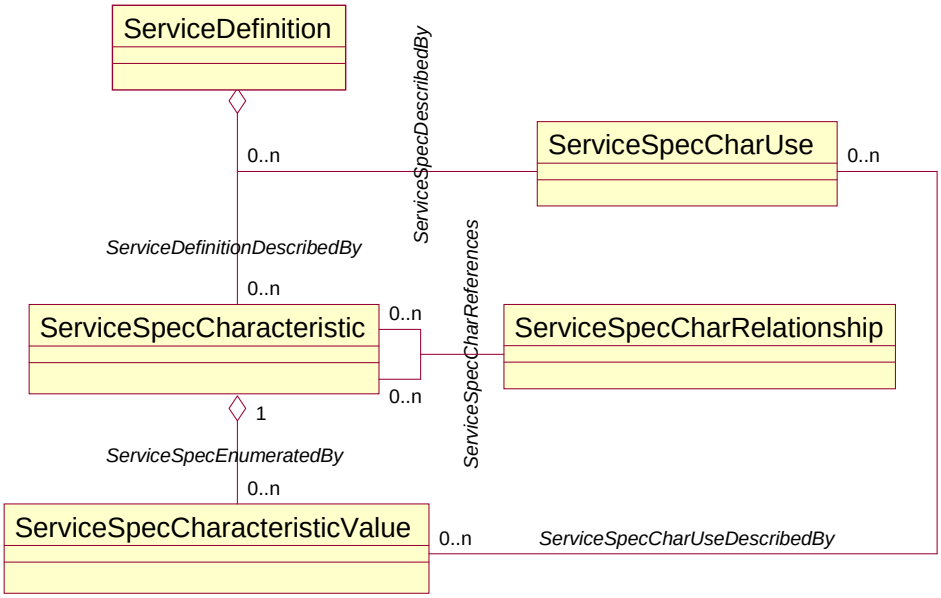

Figure 1. Service Definition Structure in UML

Entity attributes are not shown in the figure, although all entities contain attributes. In the subsections that follow, only a few entity attributes are described, as deemed important to discuss for our particular VoIP Service Definition example. For the full set of attributes for each entity, see TMF612_SB.

2.1 ServiceDefinition

ServiceDefinition is a concrete subclass entity of the ServiceSpecification abstract class (not shown in the figure). A Service Definition contains one or more ServiceSpecCharacteristics (SSCs).

The “name” attribute labels a particular ServiceDefinition instance. E.g., the value for our VoIP service definition example can be “VoIP”.

2.2 ServiceSpecCharacteristic

ServiceSpecCharacteristic (SSC) is a concrete class type of entity. The same SSC can be associated with more than one ServiceDefinition.

The “name” attribute provides a label for any particular SSC.

An SSC can be either an ‘atomic’ SSC or a ‘composite’ SSC, which is described through the ServiceSpecCharRelationship (see Section 2.4).

- an atomic SSC may be stand-alone, i.e., not contained in any composite SSC; or it may be contained in one or more composite SSCs
- a composite SSC may contain a mixture of atomic and other composite SSCs

The “valueType” attribute is used in an atomic SSC to indicate the type of data that SSC represents (e.g., String, Boolean, Integer, or Complex). That attribute is not relevant for a composite SSC.

The “minCardinality” and “maxCardinality” optional attributes within the SSC indicate the number of occurrences that an SSC could have. For example, a minCardinality value of 0 would mean that it need not occur at all. A maxCardinality of 10 would mean that the SSC could occur up to 10 times within the Service Definition, each occurrence of that SSC possibly having different associated values. For our VoIP Service Definition in Section 3, examples of SSCs that could occur multiple times are addressSet (Section 3.2.1) and interactionGroup (Section 3.2.2).

2.3 ServiceSpecCharacteristicValue

ServiceSpecCharacteristicValue (SSCV) is used to assign specific values to atomic SSCs.

As pertains to use with a Service Definition,[1] an atomic SSC may contain one or more SSCVs that a priori constrain (but may not completely determine) the values associated with that SSC for use with any Service Definition. The 1 to 0..n SSC-SSCV relationship indicates that more than one SSC value may be associated with an SSC. So, for example, for an SSC named “color” one may choose to have three values associated with it: {red, green, blue}.

The “valueType” attribute is used to indicate the type of data that SSC represents (e.g., String, Boolean, Integer, or Complex).

The “value” attribute can be used to assign a value.

The “unitOfMeasure” attribute can be used to describe the units for the value if appropriate, such as “Megabits per second”.

The “valueFrom” and “valueTo” attributes can be used to describe lower and upper bounds on a range of values, if desired and appropriate.

The “rangeInterval” attribute can also be used to express a range of values.

A composite SSC contains all the values of its constituent SSCs.

[1] SSCVs are also used with Service Templates, as illustrated in Section 5.

For the VoIP Service Definition in Section 3 we chose *not* to include any value constraints for SSCs, since any constraints are more naturally apt to be service provider-specific; i.e., will be related to specific Service Provider instances of VoIP Service Definitions.

In general, due to technical, business or regulatory reasons, there may be other rules about the relationships of SSCVs associated with SSCs of a Service Definition, or rules about combinations of values, or even rules about SSC relationships. For example, there may be rules such as:

- If SSCV =a for SSC_j, then SSC_k is not applicable.
- If SSCV=b for SSC_j, then it is required that the SSCV for SSC_k be within the range {α, β}.
- While both SSC_j and SSC_k are part of a ServiceDefinition, they cannot both be present in the same realization of the ServiceDefinition.

Those kinds of constraints would be expressed as *policy* outside of the Service Definition itself. The policy topic is not addressed further in this SD or anywhere in the TM Forum Service Activation work.

2.4 ServiceSpecCharRelationship

The ServiceSpecCharRelationship is a class association that identifies a relationship between SSCs. The nature of the relationship is expressed with the "charRelationshipType" attribute. In particular, it can indicate whether an SSC is atomic or composite, by stating whether one SSC is contained within another.

2.5 ServiceSpecCharUse

A SSC can be associated with multiple Service Definitions. The ServiceSpecCharUse is a class association used to express the relationship between a SSC and a *particular* Service Definition, and so indicates how some aspects of how the SSC may be used for that particular Service Definition.

The "minCardinality" and "maxCardinality" attributes may be used to indicate the minimum and maximum number of occurrences that the SSC can have in association with the particular Service Definition in mind, and so may be used to further restrict the number of occurrences of the SCC over what was expressed by the same attributes within the SSC itself for any Service Definition.

The "globallySet" attribute indicates whether the value(s) of this SSC must be set globally or individually for this particular Service Definition; i.e., whether the value(s) must be fixed as part of a Service Template. "Invariant" is a term that is sometimes used instead of "globally set", but means the same thing; likewise, "variant" for "individually set".

Figure 1 also shows a "ServiceSpecCharUseDescribedBy" relationship between ServiceSpecCharUse and ServiceSpecCharValue, which means that the actual values of an SSC may be further restricted for use with a particular Service Definition over what was expressed for the SSC itself for potential use with any Service Definition.

In our VoIP Service Definition example in Section 3, we have elected not to make use of ServiceSpecCharUse; i.e., we are not using it to impose cardinality or invariance or value limitations on SSCs comprising that VoIP Service Definition.

[Note: there is also a "canBeOverridden" attribute of ServiceSpecCharUse, but it does *not* apply to the Service Definition – SSC relationship. It applies to the Service Template – SSC relationship. The attribute may be used to indicate that the SSCVs of an SSC in the Service Template can be overridden during the service activation process involving a particular Service Definition. E.g., even though the only value cited in a Service Template for a 'VoiceQuality' SSC is "Mean Opinion Score= 4", it may be permissible for the

CRM layer to provide to the SM&O layer over the Service Activation Interface a ProductCharacteristic value (e.g., “Almost Telephony Quality) that maps to some other SSCV (e.g. ‘Best Effort’) that wasn’t contained in the SSC for that Service Template.]

3 A Particular VoIP Service Definition Example

The reader has learned from Section 2 that a Service Definition is essentially a collection of SSCs. This section provides a particular example of a VoIP Service Definition (i.e., a service definition for VoIP services). For the sake of simplicity, our example VoIP Service Definition does not include

- any ranges or sets of values associated with an SSC (that would, if present, be expressed through SSCVs
- min/max Cardinality information on the number of occurrences of an SSC
- whether values for an SSC must be globally set,

and, our example also does not include any further restrictions on min/maxCardinality or SSC values through the ServiceSpecCharUse relationship.

There is no single right answer for the VoIP Service Definition decomposition into specific SSCs. The basic approach used for the particular decomposition in this document was to look for natural groupings of things, and to allow for SSC hierarchies and relationships and re-use of some SSCs as seemed beneficial. A variety of product offer use case examples, not included in this document, were also used to help reveal the overall set of service capabilities that SSCs would need to reflect, and how they might be related.

Note that for our particular VoIP Service Definition example, for the sake of simplification, we are *not* including possible values (SSCVs) associated with any of the (atomic) SSCs. In practice, when a Service Provider creates a Service Definition instance, it would likely include some values or value constraints for some SSCs. Likewise, we are not indicating any range (min/maxCardinality) on the number of occurrences of any SSC.

3.1 High-Level SSCs that Comprise the VoIP Service Definition

The SSCs in this section are a high-level decomposition of VoIP service into different functional areas.

The SSCs in Table 1 are all composite SSCs made up of atomic and/or other composite SSCs. Because they are all composite SSCs, they do not have a valueType attribute. The sections that follow list and further describe the SSCs that each of these composite SSCs include.

Each row in the table represents a different SSC.

Table 1. High-Level SSCs

	SSC name	explanation
1.	makeOrReceiveCalls	Allowing the users to either make outgoing calls or receive incoming calls or both, as a network-external endpoint.
2.	userInteraction	Allowing announcement or prompt & collect type interactions between the user and the service provider

		resources on behalf of the customer.
3.	callDistribution	Allowing network-based automatic call distribution among multiple customer endpoints.
4.	sophisticatedConferencing	Allowing large scale-oriented, service provider resources-based conferencing with sophisticated features.
5.	presence	Allowing a user's availability to be known to other parties.
6.	webPortal	Allowing call initiation or acceptance via a web interface.

3.2 Lower-Level (More Granular) SSCs

The following subsections identify more granular SSCs associated with each of the high-level SSCs listed above. Most of these more granular SSCs, but not all, are atomic.

The tables that follow focus on the following aspects of the SSCs:

1. a couple key SSC attributes
   - name: essentially a terse but human-friendly name given to the SSC
   - valueType: the *type* of data that the SSC represents
2. which other (composite) SSCs that SSC may be included in; such composite SSCs are each listed with a dash
3. further explanation of the SSC, including in some cases *illustrative* data values

SSCs in italics that appear more than once, such as *addressSet,* are SSCs that have multiple uses and are contained in multiple composite SSCs.

The valueTypes for some SSCs are 'complex', which will require further explanation in each case about what that means.

Some SSCs reflect data elements that could be entered by a subscriber of a product after service activation has occurred for that product; for example, an address set for incoming call screening. The purpose of supporting such SSCs as part of service activation is to allow initial values for such data to be passed as part of the service activation process, so that it is *not required* that a subscriber of that product (or surrogate of some kind) enter that data.

3.2.1 Lower-Level SSCs related to makeOrReceiveCalls

Each row in the table represents a different SSC.

Table 2. SSCs related to the makeOrReceiveCalls SSC

	SSC name	valueType	explanation
1.	makeCalls	NA - composite	

	- makeOrReceiveCalls	SSC	
2.	receiveCalls - makeOrReceiveCalls	NA - composite SSC	
3.	*addressSet* - makeCalls - receiveCalls	Complex (Note A)	Addresses to be employed for the respective capability such as making or receiving calls or call screening; examples addresses are 1+732-430-2913 of E.164 type, and shlomo@serviceprovider.com of sip type. There can be multiple addressSets.
4.	*addressSetPositive* - *addressSet*	Boolean	Whether the address set is a positive or negative list, used with *addressSet* in some cases such as screening or list of addresses that can watch a user (presence).
5.	*password* - *addressSet*	String	Example uses: - an access code associated an access number (e.g., a prepaid card access number) - an override code for outgoing call screening restrictions
6.	qualityOfVoiceExperience - makeOrReceiveCalls	String	Example associated SSCValues may be “MOS=4” as per ITU-T P.800, or “Best Effort”;
7.	*applicationLogicID* - makeCalls - receiveCalls	String	Identifier for application logic and data, for example, that is used for call screening. May be customized per-customer. Data for call screening could include addresses and what treatment they get depending on various factors such as time of day. (Note B)
8.	billTo3rdParty - makeCalls	Boolean	Whether allowed
9.	collectCall - makeCalls	Boolean	“
10.	personToPerson - makeCalls	Boolean	“
11.	fraud/UncollectiblesManagementClassification - makeOrReceiveCalls	String	Classification that the service provider/network may use for fraud management purposes
12.	ipFax - makeCalls	Boolean	Whether allowed
13.	*authorizationCode/PIN* - *applicationLogicID*	String	Essentially a code to allow the user to do certain things such as place pre-paid calls or override call screening restrictions
14.	announcementSetID - *applicationLogicID*	String	For incoming or outgoing call screening. Can be multiple announcement sets.
15.	announcementSetCapacity	Integer	Could be expressed in Bytes or number of

	- *announcementSetID*		announcements, or both. As such, could have multiple occurrences of this SCC.
16.	automaticCallBack - makeCalls	Boolean	Whether allowed
17.	callWaiting - receiveCalls	Boolean	"
18.	callForwarding - receiveCalls	Boolean	"
19.	presentationRestrictedCallingName/Address - makeCalls	Boolean	"
20.	redialLastAddressCalled - makeCalls	Boolean	"
21.	callHold - receiveCalls	Boolean	"
22.	callTransferBlind - makeCalls	Boolean	" Involves blind transfer; first agent does not stay on the transfer to know whether successful.
23.	callTransferIfAnswered - makeCalls	Boolean	" Involves transfer only if successfully answered by 2nd agent, otherwise call remains with first agent. Involves no conferencing.
24.	callTransferWithConferencing- makeCalls	Boolean	" Involves conferencing 1st and 2nd agents with calling parting temporarily, after which 1st agent can drop off
25.	reportAddressofLastIncomingCallToAuthorities - receiveCalls	Boolean	"
26.	receiveIncomingCallingName/Address - receiveCalls	Boolean	"
27.	duringCallSpontaneousConferencing - makeCalls	Boolean	"
28.	*max#SimultaneousCalls* - makeOrReceiveCalls	Integer	

A. addressSet SSC consists of a collection of a finite set of addresses and/or ranges of addresses, where the *types* of addresses must also be specified (e.g. E.164, sip, sips, pres, http, https), and the nature of use (e.g, endpoint address, access address, webportal address, etc.).

B. The way call screening is expressed in this example of VoIP Service Definition, it is implicitly assumed that there are *not* any significant network resources consumed in order for the network to interact with the

caller. Otherwise, besides embedding schedule items and screening treatments in the application logic governing call screening, one would have to include userInteraction type SSCs (Section 3.2.2) to cover the network resources (e.g., Media Servers) needed – what types, how much, and when.

3.2.2 Lower-Level SSCs related to userInteraction

Each row in the table represents a different SSC.

Table 3. SSCs related to the userInteraction SSC

	SSC name	valueType	explanation
1.	*addressSet* - userInteraction	Complex	The set of addresses the users would call. For example, FreePhone numbers.
2.	*scheduleElement* - userInteraction	Complex (Note C)	
3.	inputTypes - userInteraction	List of strings	
4.	outputTypes - userInteraction	List of strings	
5.	*announcementSetID* - userInteraction	Strings	
6.	announcementSetCapacity - announcementSetID	Integer	Could be expressed in Bytes or number of announcements, or both.
7.	*applicationLogicID* - userInteraction	String	For driving the user interaction and deciding what happens next.
8.	*max#SimultaneousCalls* - userInteraction	Integer	Max number of user interactions occurring at any one point in time.
9.	max#SimultaneousRecordedCalls - userInteraction	Integer	
10.	interactionGroup - *addressSet*	NA - Composite SSC	Composite SSC comprised of the set of SSCs 2-9 above. The interactionGroup SSC is *associated* with a given addressSet, although the latter is not part of the composite SSC. There can be multiple interactionGroups, and multiple interationGroups can be associated with the same addressSet. (Note D)

C. scheduleElement SSC data would need to depict schedule data such as
- periodic with begin and end time frames and with possible exceptions; e.g. reflect "9:00-17:00 GMT every Tuesday from now through Dec. 31, 2010" or "every 4th Monday of the month unless it's Feb. 29 from 10 August 2007 through 31 December 2008"
- one time; e.g., "8:30-12:30 GMT Wednesday October 31, 2008" Note that there is an overall schedule as well, made up of a set of schedule elements, but it suffices and makes more sense to focus on the elements within the schedule, because different addresses and actions will be associated with different schedule elements, and not the overall schedule. E.g., 'On Sundays 5 PM – 9 AM, *calls to 1+800-555-1234 are provided announcement number 56'*.

D. This composite SSC is intended to reflect the kinds of network resources (e.g., Media Servers) needed to support user interactions – the collection of {what types, how much, when}. See Appendix A for an illustration.

3.2.3 Lower-Level SSCs related to callDistribution

Call distribution would be used in the context of receiving calls. It may be used in conjunction with other capabilities, such as user-interaction capabilities described above. (In that case, the network may be interacting with the caller on an automated basis, and them also completing the call to a destination endpoint.)

Table 4. SSCs related to the callDistribution SSC

	SSC name	valueType	explanation
1.	*addressSet* - callDistribution	Complex	
2.	callDistributionApplicationID - callDistribution	String	Application & data identifier. Could be different types of algorithms or perhaps customer-specific. (Note E)
3.	customerRoutingDatabaseInterfaceAddress - callDistribution	String	For the service provider querying a customer database to retrieve routing information
4.	networkQueuing - call Distribution	Boolean	Whether network queuing is supported.
5.	networkQueuingAlgorithmID - networkQueuing	String	Algorithm identifier. Could be different types of queuing algorithms or perhaps customer-specific. Note that queuing here may include playing announcements to the user or some other form of status notification to the user (e.g., through email or web site), but that is not the same as the userInteraction SSC. A network queuing algorithm, if employed, works in conjunction with the call distribution algorithm.

6.	*scheduleElement* - callDistribution - networkQueuing	Complex	For call distribution or queuing, schedule elements for when to deliver calls to various endpoints
7.	*maxCallArrivalRate* - callDistribution - networkQueuing	Integer	Poisson arrivals calls per second, for what the call distribution can handle.
8.	*max#SimultaneousCalls* *-addressSet*	Integer	For calls in queue.
9.	announcmentSetID - networkQueuing	String	For use with queuing. Note: because we have only listed announcementSetID as being related to queuing, the assumption is that if a call is 'final handled' with an announcement, it is done through the queuing algorithm and not through the call distribution algorithm.
10.	announcementSetCapacity - announcementSetID	Integer	Could be expressed in Bytes or number of announcements, or both. As such, could have multiple occurrences of this SCC.

E. By the way call distribution is expressed in this example of VoIP Service Definition, it is implicitly assumed that there are *not* any significant network resources consumed in order for the network to interact with the caller as part of the overall call distribution/network queuing activity. Otherwise, besides embedding schedule items and screening treatments in the application logic governing call distribution, one would have to include userInteraction type SSCs (Section 3.2.2) to cover the network resources (e.g., Media Servers) needed – what types, how much, and when.

3.2.4 Lower-Level SSCs related to sophisticatedConferencing

Each row in the table represents a different SSC.

Table 5. SSCs related to the sophisticatedConferencing SSC

	SSC name	valueType	explanation
1.	*addressSet* - sophisticatedConferencing	Complex	Set of addresses for calling into conferences.
2.	nLoudest - sophisticatedConferencing	Integer	Audio out to the participants is the mixing of the n loudest current participants
3.	conferenceType - sophisticatedConferencing	String	e.g., audio or video
4.	maximumConferenceSize	Integer	Max number of conference participants

	-sophisticatedConferencing		
5.	conferenceCodingFormats - sophisticatedConferencing	List of strings	
6.	conferenceRecording - sophisticatedConferencing	Boolean	
7.	conferenceAudioRecordingFormat - conferenceRecording	String	E.g., wav or compressed of some particular type
8.	conferenceRecordingCapacity - conferenceAudioRecordingformat	Integer	
9.	conferenceSidebarCapability - sophisticatedConferencing	Boolean	
10.	conferenceHelpAgent - sophisticatedConferencing	Boolean	
11.	conferenceAnonymousParticipants - sophisticatedConferencing	Boolean	Whether allowed
12.	conferenceControlMethods - sophisticatedConferencing	List of strings	E.g., control method could be DTM Forum, web browser interface, XCON, or combinations thereof
13.	conferenceReservation - sophisticatedConferencing	Boolean	Whether reservations are allowed

3.2.5 Lower-Level SSCs related to presence

Each row in the table represents a different SSC.

Table 6. SSCs related to the presence SSC

	SSC name	valueType	explanation
1.	restrictedGroupOfWatchers - presence	Boolean	Whether the set of potential watchers may be restricted.

2.	*addressSet* - presence - restrictedGroupofWatchers	Complex	The set of addresses associated with the user that can be watched. The positive/negative set of addresses allowed/not allowed to watch the user. There may be multiple occurrences of that SSC, in order to allow for different presence information to be shared with different sets of watchers.
3.	addressSetPositive - *addressSet*	Boolean	Whether the address set for restrictions on watchers is positive or negative. (I.e. only those in the address set can watch, or anybody except those in the set.)
4.	watchersOfWatchers - presence	Boolean	Whether watchers can be watched.
5.	whatInformationCanBeSharedWithWatchers - *addressSet*	List of strings	Set of presence characteristics that may be shared with watchers (such as role or location or mood).
6.	max#SimultaneousWatchers - presence	Integer	
7.	max#SimultaneousWatchersofWatchers - presence	Integer	

3.2.6 Lower-Level SSCs related to webPortal

Note that the attributes here are only related to calling. They do not address the use of the web portal for other purposes such as subscribers managing users, or the customers viewing data/status information about their products, or email access, or modifying what products they have; those are out of scope.

Each row in the table represents a different SSC.

Table 7. SSCs related to the webPortal SSC

	SSC name	valueType	explanation
1.	*addresssSet* - webPortal	Complex	E.g, an address such as “serviceportal.acmeserviceprovider.com”, and address type “http”, and nature of use “web portal”
2.	webPortalMakeCalls - webPortal	Boolean	Whether a user is allowed to initiate calls through the web portal.
3.	webPortalReceiveCalls	Boolean	Whether a user is allowed to see and accept incoming call attempts via the web portal.

	- webPortal		
4.	webPortalAddressBook - webPortalMakeCalls	Boolean	Whether an address book feature is supported in conjunction with making calls via the web portal.
5.	webPortalCallHistory - webPortal	Boolean	Whether a calling history feature is supported via the web portal.
6.	webPortalPresence - webPortal	Boolean	Whether presence information can be administered by the subscriber through the portal
7.	webPortalCallForwarding - webPortal	Boolean	Whether a call forwarding feature can be administered by the subscriber through the portal

4 Extensibility of the VoIP Service Definition

Any Service Definition can be extended or modified by adding or deleting SSCs and identifying the SSC relationships, or by modifying the value constraints associated with an SSC.

In practice, the implementer should keep in mind the consequences of actually modifying an existing Service Definition instance, as opposed to creating a new one that reuses some of the content of an existing one. Changing an existing Service Definition instance may result in a mismatch with some of the Service Template, Product Specification, or Product Offer instances associated with the original Service Definition instance.

5 Service Template Example

This section provides a specific example of a Service Template derived from the VoIP Service Definition. A Service Template fixes values of SSCs. Those “invariant” or “globally set” values would then be reflected in any Product Specification (through fixed ProductCharacteristicValues) that the Service Template supports. The creation and use of a Service Template, and therefore for which SSCs to fix values and what those values are, is purely at the discretion of the service provider. The benefit of a Service Template is that it avoids the need to pass *all* ProductCharacteristicValue information over the SAI. The product information for which the corresponding SSC values are fixed need not be passed from CRM to SM&O. The Service Template, which SM&O already has, simply needs to be looked up.

Since the purpose of a Service Template is to support service activation for one or more Product Specifications, and through them Product Offers, a specific Product Offer example is first described below, and next a specific Service Template is described that would be used to support that product offer. In addition, a specific product (i.e., instantiation of the Product Offer) purchased by a customer will be considered. Finally, the Customer Facing Service instantiated to support that product is described.

Note that the illustration below involves a product offer that does not utilize (through corresponding PSCs) *all* of the SSCs in the VoIP Service Definition. Other product offers may utilize more or other SSCs in the VoIP Service Definition.

5.1 Specific Product Offer Example

The specific product offer example, ‘Untethered Voice’, which is offered by the service provider Acme, consists of the following:

- The user can make outbound calls from any phone by using an access address and personal password
- Callers can reach the user by calling one of the addresses assigned to the user
- Features:

  - Call forwarding, no-frills, by which means the user/subscriber can designate an endpoint/address at which calls are to be received. Call forwarding is updated through a web interface involving a user (really ‘subscriber’ in SID terms) login.

  - Presence, no-frills, also managed through the same web interface.
- Calls are of POTS-equivalent perceived quality
- Up to 10 calls/call attempts at a time
- When making calls, password entry by the user is performed by speaking the password characters in English

Note that there are no specific endpoints associated with this product offer; e.g., no particular DSL or POTS line or wireless access devices.

There are also other aspects of the product offer such as billing details, but those are not relevant to the Service Template or Service Definition considerations.

A more formal description of a product offer, not provided here, would consist of ProductSpecCharacteristics (PSCs) with various attributes, similar to ServiceSpecCharacteristics for a Service Definition or Service Template. Likewise, PSCs may have associated PSC Values (PSCVs). A product offer is derived from a Product Specification. A Product Specification in the CRM domain corresponds to a Service Specification in the SM&O domain (where a Service Definition is one type of Service Specification).

It may be the case that

- there is a 1:1 association between a PSC and SSC; for example, a voiceQuality PSC associated with the qualityOfVoiceExperience SSC, where a PSCV of “as good as POTS” would map to an SSCV of “MOS=4”. Such an SSC is defined in our VoIP Service Definition example and is used in the service template example below for the Untethered Voice product offer.

or

- one PSC maps to multiple SSCs; for example a PSC of ‘offeringLevel’ with potential associated PSCVs of “Platinum” or “Gold” or “Silver” could map to different collections of SSCs pertaining to different feature sets.

or

- multiple PSCs map to one SSC; for example at the Product Offer level, there may be different PSCs for different kinds of addresses (access numbers to make outgoing calls, voice endpoint numbers, web portal addresses, etc.) that all map to a single ‘addressSet’ SSC that covers all kinds of addresses and uses. Such an SSC is defined in our VoIP Service Definition example and used in the service template example below for the Untethered Voice product offer.

When there is a 1:1 correspondence between a PSC and SSC, it may be the case that they share the same name and meaning, which is to say that what is relevant at the product level is also identically relevant at the service level. For example, for the SSCs

- userID
- password

used in this example (see below), it would be natural to have corresponding PSCs

- user ID
- password

where they would also take on the same values.

5.2 Specific Product - i.e., Instantiation of the Product Offer

A customer, Mae West, purchases the Untethered Voice product offer from Acme Service Provider. For her product (her instantiation of the product offer), she is assigned the following:

- For making calls: Access address 1+888-123-4567 and initial PIN ae45jfWW*
- Addresses for receiving calls: sip:mae.west@acme.com and 1+500-623-9378.
- Web interface access address https:untethered.acme.com, login ID ‘Mae West’ and initial password OO00pps!

There is no assumption that the customer Mae West is in fact the user, or the only user of this product. For example, Mae West’s secretaries may be the primary users.

All Untethered Voice users use the same access address (1+888-123-4567) for making calls and the same web site address (https:untethered.acme.com) for features. Therefore, those values are identified in the specific service template (Service Template A) supporting the Untethered Voice product offer.

On the other hand, the following customer-specific data would *not* be part of the service template supporting the Untethered Voice product offer:

- initial PIN corresponding to the access address, ae45jfWW*
- addresses for receiving calls, sip:mae.west@acme.com and 1+500-623-9378.

Those 'ProductCharacteristicValues' would be passed across the CRM-SM&O interface as part of the service activation request.

Likewise, the login ID 'Mae West' and initial password for the web site "OO00pps!" would not be part of the service template. However, that data constitutes subscriber information, so would not be passed over the SAI – see the next section.

5.3 Specific Service Template Supporting the Product Offer

This subsection describes the essence of the specific service template instance, referred to here as Service Template 'A', for supporting the Untethered Voice product offer. The same service template could support other product offers as well. The VoIP Service Definition SSCs and their corresponding SSC*Values* that comprise Service Template A are listed, without going into details of SSC attributes or other attributes that any service template itself would have. The SSCValue column also reminds the reader of the type of value for each SSC.

As indicated previously in this document, composite SSCs themselves do not have values.

Table 8. Service Template A

	SSC **(from the VoIP Service Definition)**	**SSCValue**	**Comment**
1.	makeOrReceiveCalls	none – composite SSC	
2.	makeCalls	none - composite SSC	
3.	receiveCalls	none - composite SSC	
4.	*addressSet* - makeCalls	1+888-123-4567; E.164;accessaddress (Complex)	There is only one address in this set. The specific address, its type (e.g., sip or E.164) and nature of use (e.g. access address for making calls, endpoint address, address used for outgoing or incoming call screening) are all specified. This particular instance of the addressSet SSC would include the 'is contained by' attribute that would identify the makeCalls composite SSC
5.	qualityOfVoiceExperience - makeCalls and receiveCalls	MOS=4 (String)	Mean Opinion Score is an ITU-T method (recommendation P.800) of describing perceived voice quality; at the Resource level it would be translated to other specific values of characteristics

			such as delay, jitter, and codec types. A MOS value of 4 means quality=good and impairment=perceptible but not annoying Note that in this example, the perceived quality description in the product offer of “POTS-equivalent” is represented by MOS=4 in the service template.
6.	max#SimultaneousCalls - makeOrReceiveCalls	10 (Integer)	
7.	callForwarding - receiveCalls	True (Boolean)	
8.	presence	none (composite SSC)	
9.	webPortal	none (composite SSC)	
10.	*addressSet* - webPortal	untethered.acme.com; https;webportal (Complex)	Address the user uses to access the web portal and type of address. This particular instance of the addressSet SSC would include the “containedBySSCReferenceList”attribute that would identify the webPortal composite SSC
11.	webPortalCallForwarding - webPortal	True (Boolean)	Whether a call forwarding feature can be administered by the subscriber through the portal
12.	webPortalPresence - webPortal	True (Boolean)	
13.	userInteraction	None - composite SSC	
14.	*addressSet* - userInteraction	1+888-123-4567; E.164;accessaddress (Complex)	
15.	inputTypes - userInteraction	{“simple word recognition – American English”} (List of strings)	This list only has one entry.
16.	outputTypes - userInteraction	{“Announcements”} (List of strings)	This list only has one entry.
17.	announcementSetID - userInteraction	{“245” } (List of strings)	This list only has one entry.

18.	max#SimultaneousCalls - userInteraction	10 (Integer)	This value could probably be inferred from the max#SimultaneousCalls listed for – makeAndReceiveCalls, but better to put it here separately for -userInteraction

5.4 Specific Customer Facing Service Instantiation for Mae West's Product

As part of the service activation process to have the product ready for use, one or more Customer Facing Services (CFS) would be instantiated to support the product. In this example for Mae West's product, only one CFS will be instantiated. We'll call it CFS 'X'.

Strictly speaking, any CFS simply consists of a set of ServiceCharacteristicValues (SCVs), which are merely instantiations of SSCVs. Of course, the meaning of an SCV can only be understood by recognizing the SSC with which it is associated.

To create CFS X, SM&O would use the following information in the Service Activation request from CRM:

- The productSpecificationName
- The variant[2] productCharacteristicIDs
- The associated variant productCharacteristicValues

SM&O would map the particular productSpecificationName associated with the Untethered Voice product offer to Service Template A. So all the SSCVs in Service Template A would result in instantiations that become part of the set of SCVs comprising CFS X.

Because SM&O knows that Service Template A was derived from the VoIP Service Definition, SM&O also knows that the VoIP Service Definition supports the Untethered Voice product offer. SM&O would then link the variant productCharacterisitcIDs to associated variant SSCs in the VoIP Service Definition, and use that to map the variant productCharacteristicValues to SSCVs. Those SSCVs would result in instantiations that become part of the set of SCVs comprising CFS X.

CFS X would thus consist of the following set of SCVs:

- SCVs as instantiations of all the SSCVs in Service Template A as described above

and

- the following two SCVs as determined through use of the VoIP Service Definition:

	SSC name (from the VoIP Service Definition)	SCV	Comment
1.	*addressSet* -receiveCalls	{mae.west@acme.com;sip;user address, 1+500-623-9378; E.164;useraddress} (Complex)	The "containedBySSCReferenceList" attribute of this particular instance of this SSC would identify the receiveCalls composite SSC

[2] 'Variant' here reflects values that are assigned only for that particular product (e.g., the address sip:mae.west@example.com for Mae West's product), as opposed to being fixed/'invariant' values of the product offer (e.g., the 1+888-123-4567 number for placing outgoing calls that is used for Mae West's product and any other customer's product under the Untethered Voice product offer). The fixed/invariant values are contained in the Service Template.

2.	password - makeCalls	ae45jfWW* (String)	The “containedBySSCReferenceList” attribute of this particular instance of the password SSC would identify the makeCalls composite SSC

In the table immediately above all of the SSCs happen to be atomic SSCs (not composite), and each is contained in a composite SSC already listed in Service Template A. Thus those composite SSCs are already ‘known’ and so are not redundantly listed.

In this Product/Service Template example, a single Subscriber ID value would also be passed over the Service Activation Interface from SM&O to CRM. While a subscriber ID has nothing to do with the VoIP Service Definition or Service Template, it is necessary for SM&O to have that information. It is assumed that the actual subscriber information – in this example, the web portal login name “Mae West” and password “OO00pps!” for web portal access - gets passed over an interface other than the SAI. The Subscriber ID that is passed over the SAI would be used by SM&O to discover that associated subscriber information.

CFS X would be used to drive Resource Facing Service and Resource levels of Service Activation. This SD does not address those topics.

6 SAPs and VoIP Service Definition

In general terms, a Service Access Point (SAP) represents a set of parameters associated (directly or indirectly) with a unique (logical and/or physical) resource where the Service can be accessed. A Service may be associated with multiple SAPs, such as a VoIP Virtual Private Network service with multiple customer location endpoints.

It would be incorrect to say that a VoIP Service Definition always has associated SAPS or that it never has associated SAPs. Rather, it depends on the particular Product Offer. The particular VoIP Product Offer example in the prior section is one that, for service activation, there are no SAPs.

On the other hand, a particular VoIP Product Offer *may* have an associated SAP. For example, a Product Offer may involve client software or configuration data (device or product or user profile data) that is downloaded into a specific customer device to be used with a product purchased from the Product Offer; e.g., a particular cellular phone or SIP Terminal adaptor or IP PBX. In such a case, that device would be a SAP for purposes of service activation. Likewise, if the product *requires* the use of a specific customer device, say as identified by some kind of ID (e.g., cellular phone MIN or IP PBX ethernet MAC address or authentication information) when it interacts with the network, that device is a SAP for purposes of service activation.

As stated in Section 1, access methods (e.g., DSL, cable, wi-fi, ethernet, satellite) are not included in the VoIP Service Definition example in this document. Those are Service Access Components that can be defined in their own right through their own collections of SSCs. Generally, instantiations of such service access components would have SAPs associated with them, e.g., a standalone modem for DSL or cable access, a gateway for wi-fi, a router for ethernet, a transceiver for satellite. However, those would generally *not* be SAPs for VoIP product offers, i.e., product offers derived from VoIP Service Definition, because they are not devices that provide VoIP-level functionality.

7 Abbreviation List

BA	Business Agreement
CFS	Customer Facing Service
CRM	Customer Relationship Management
IP	Internet Protocol
MIN	Mobile Identification Number
MOS	Mean Opinion Score
mTOP	multi-Technology OSS Program
NA	Not Applicable
PBX	Private Branch Exchange
PSC	ProductSpecCharacteristic
PSCV	PSC Value
OSS	Operations Support Systems
SAI	Service Activation Interface
SAP	Service Access Point
SD	Supporting Document
SID	Shared Information/Data (model)
SM	Service Management
SM&O	Service Management & Operations
SCV	ServiceCharacteristicValue
SSC	ServiceSpec(ification)Characteristic
SSCV	SSC Value
UML	Unified Modeling Language
VoIP	Voice over IP (Internet Protocol)
XML	eXtensible Markup Language

8 References

[1] TM Forum518_SB, Service Basic DDP BA

[2] TM Forum518_SA_1, Service Activation DDP BA, Part 1: Overview

[3] TM Forum518_SA_2, Service Activation DDP BA, Part 2: Service Activation Interface

[4] SD2-0_mTOPDictionary, The mTOP Dictionary

[5] TMF612_SB, Service Basic IA specifications

9 Appendix A - Motivation for the interactionGroup Composite SSC

The purpose of this section is to illustrate the motivation for the interactionGroupSSC, by looking at a particular product example.

Product View for the example

A customer (say Nifty Widgets Company) purchases a VoIP product where callers can call an interactive system to get technical support for widgets they bought. Think of this as a FreePhone type offering where the calls are handled by network resources (e.g., Media Servers controlled by Application Servers, all in the network).

Acme has two classes of support treatment, say 'regular' and 'gold'.

The particular VoIP product that Acme buys is as characterized in the table below. 'Regular' Nifty Widgets customers dial one phone number and get some kind of treatment, which varies by weekday or weekend. 'Gold' Nifty Widgets customers dial another number and get a different kind of interactive treatment. There are other differences such as the maximum call capacities involved or the ability to record interactions.

Table 9. Product Characterization

Address	Time Interval	Application Logic	Input Type	Announcement Set	Max # Simultaneous Calls	Record the call?
1+800-123-4567 for regular	Mon-Fri	Application Logic #1	DTM Forum	Custom announcements for ACME regular customers	40	No
"	Sat-Sun	"	DTM Forum, Simple isolated word recognition	"	100	No
1+800-123-6789 for gold	Mon-Fri	Application Logic #2	DTM Forum, Simple isolated word recognition	Custom announcements for ACME gold customers	20	Yes
"	Sat-Sun	"	DTM Forum, Natural Language	"	70	Yes

Note that for service activation and considering what resources to deploy, it is the *collection* of values in each row that must be known *together*. It would be insufficient to say DTM Forum resources are needed,

and independently say that some kind of resources are needed to handle up to 100 calls per second, and independently say that recording is needed for some calls, etc.

VoIP Service Defintion View

Continuing to track the above example, since product details can only be possible if they were originally in the source VoIP Service Definition used to derive product offerings, that definition would have to allow for a *collection* of SSCs about time intervals, application logic, user input types accepted, which announcement sets, and maximum call volumes, all to be associated with a given address.

So for this example, the following SSCs would together form a group that can be associated with an addressSet SSC:

- scheduleElement
- inputTypes
- announcementSetID
- applicationLogicID
- numberSimultaneousCalls
- record

This is just a simple example, and one can consider other SSCs that would be meaningful to add the group, and voilá the interactionGroupSSC in Table 4 of Section 3.2.2.

Finally, note that the composite SSC interactionGroup can have multiple simultaneous occurrences, which allows one to express the multiple rows in the table above.

10 Administrative Appendix

10.1 Document History

Version Number	Date Modified	Modified by:	Description of changes
1.0	Nov 2007		This is the first version of this document

10.2 Acknowledgments

This Supporting Document was created by the TM Forum mTOP-Service Management team. The following people especially contributed to this particular document.

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10.3 How to comment on this document

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Please be specific, since your comments will be dealt with by the team evaluating numerous inputs and trying to produce a single text. Thus we appreciate significant specific input. We are looking for more input than “wordsmith” items, however editing and structural help are greatly appreciated where better clarity is the result.